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R. H. STINCHFIELD, *Managing Editor* SID NOBLE, *Editor*
Editorial Offices: 19 West 44th Street, New York

VOLUME XI NUMBER TWO

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Agricultural and Scientific Bureau
N. V. POTASH EXPORT MY.
of Amsterdam, Holland
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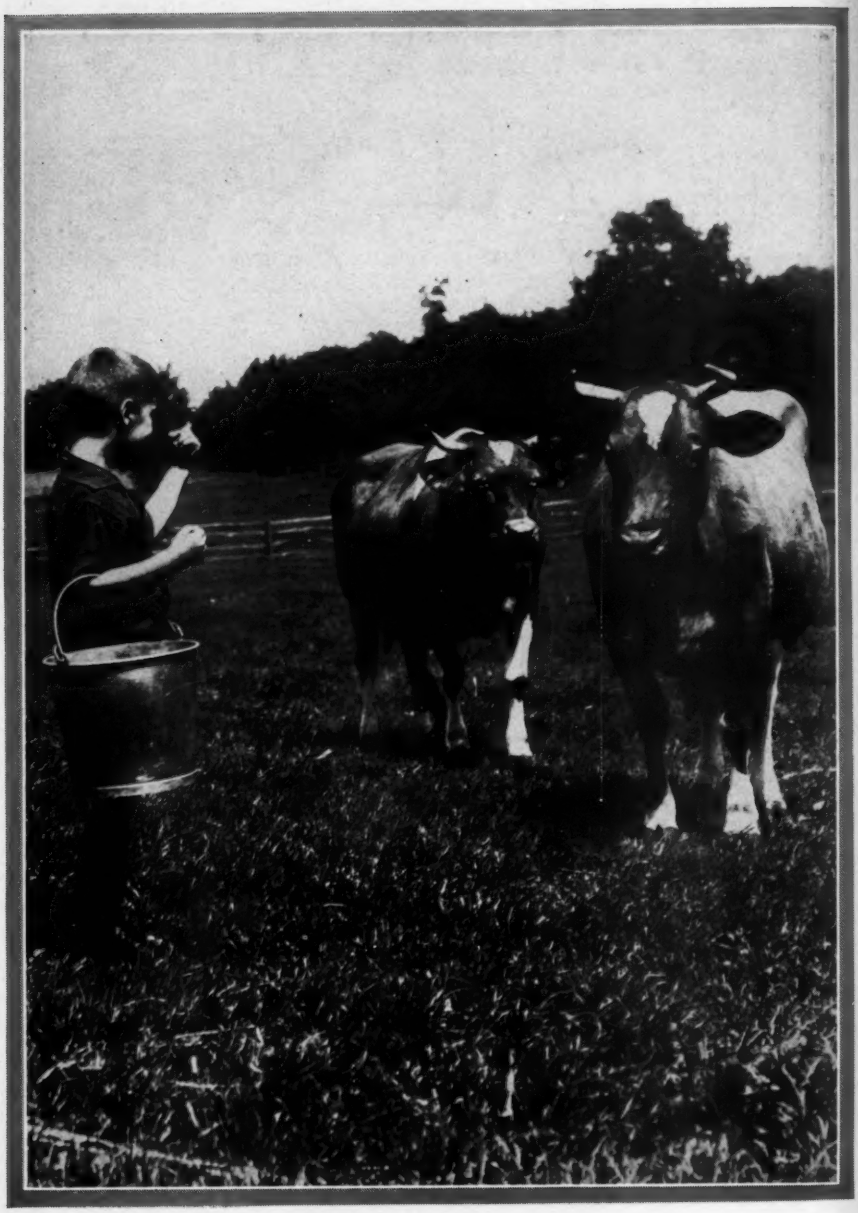

"Just a quart, please!"

Better Crops with Plant Food

Published Monthly by the Better Crops Publishing Corporation, 19 West 44th Street, New York. Subscription, $1.00 Per Year; 10c per Copy. Copyright, 1928, by the Better Crops Publishing Corporation, New York.

Vol. XI NEW YORK, AUGUST, 1928 No. 2

Jeff says it's easier to flower weeds than to weed flowers—in

Gardening

By Jeff McDermid

BEFORE you can be quite certain that you are a purposeful gardener, I am afraid you must drag down the dictionary again. Don't assume too much because the neighbor's hens visit you regularly.

If you find upon investigation that you are indeed growing oleraceous and esculent herbs where none of that family thrived before, then perhaps you can take courage. However, you'll have to be very circumspect and cautious about announcing it, because I have found botanical relationships confusing in the extreme when I least suspected it.

For instance, I once grew a row of chard that was beautifully mixed with lamb's quarters, and in the same season I spent much time removing the latter and labored incessantly likewise in separating pigweed from my spinach. To my dismay I found that all four of these noble leafy plants belong to the same botanical tribe. They were all *Chenopodiaceae*, otherwise known as goosefoot plants. We might have enjoyed a salad of lamb's quarters or a mess of pigweed greens just as much as we relished the two other more fortunate members of the family whose names stand in the "social reg-

ister." You can't dismiss this case by saying that "a weed is a plant out of place." The pigweed and the spinach were about fifty-fifty in the rows anyhow, and I can't undertake to prove which seed got there first.

Of course, if it hadn't been for good old Linnaeus and his Species Plantarum of 1753, aided and comforted by the modern seed catalogs, we might have kept on growing all these kindred herbs in cosmopolitan confusion without having the neighbors call us lazy. All plants are vegetables anyhow, and in *my* garden it is much easier to flower out the weeds than it is to weed out the flowers.

SOME day I shall write a brochure on the subject, Why Do You Garden, And If So, When. My garden would make an ideal laboratory to follow out the theme of such a thesis. My wife wonders why I garden, and the neighbors wonder when.

As most of the worthy bulletins on pastoral arts come from experiment stations, I do not hesitate to give you the last word on oleraceous and esculent herbs, not to mention foolproof perennials and accidental hybrids. My garden is an experiment station or it is nothing—perhaps both! And my right to write is undisputed. If this treatise doesn't win your confidence, pass on to some other oracle.

In my philosophy I recognize five kinds of gardens and gardening, viz. and to wit: winter and summer; absentee or mental gardening; and the formal and informal. The winter and absentee systems require no tools, but for the three other kinds I advise building a machine shed.

In my winter gardening I empty more cigarette packets than seed packets. My urge for winter gardening has the added thrill that comes because my seed and nursery catalogs arrive on the rural delivery by the same red-faced carrier who brings my bills and the bulky South Dakota bibles. He is the Santa Claus of my pipe dreams, and the government pays him to bring me solace amid the snows. He showers upon me the stimulus of Henderson and Ferry, the neighborly backslapping of the Seed Sage of Shenandoah, and presents me with a picture gallery of wonder-berries beyond compare.

He makes me forget the quackgrass roots of literal life while I revel in the land of lithographs. The main reason why I never imbibe spring bitters as a tonic is because those gorgeous catalogs in the dormant season have given me the needful bracer.

As an overture to the opening number of spring's song, give me a dozen showy vermilion and green catalogs. Their promises and their price lists are both precious to me. I inherit this trait from a goodly race of Scotch forebears who investigated but seldom invested. I may finally pick out my seeds at a grocery store for a nickel a throw, but somehow I never regret the fun of planting the catalog stuff I never bought. This constitutes my winter garden.

ABSENTEE gardening is the most painful of all. It arises partly from envy and partly from admiration, and carries with it a sense of horticultural inferiority complex.

I visited a glorious Canadian experimental farm garden at Guelph last July. I found myself engaged in absentee gardening within five minutes of interviewing the florist. Borders take my fancy, and he had the nicest strip of Tagetes Marigold you ever saw under a brilliant sun, flanked by ribbon rows of white alyssum and a blue belt of ageratum. I filled my eye and my note book. I dreamed about the transformation to be made in my own prosaic plot by this imported idea, brought home duty free to gladden the neighbors and foil the dandelions.

The nearest approach to that shade

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Corncobs

By Arthur P. Chew

United States Department of Agriculture

As yet the packer, saving all of the hog but the squeal, is more advanced in utilizing by-products than most other handlers of farm commodities. Whether he will hold his advantage is a question. Chemists in the Bureau of Chemistry and Soils of the United States Department of Agriculture have recently made some startling discoveries as to the possibility of using cereal wastes. They are hot on the trail of what is in the corncob, and it looks as if that lowly object and similar products might turn out to be treasure trove.

Corncobs contain among other things a substance called lignin. Dr. W. W. Skinner, assistant chief of chemical research of the bureau, recently told a congressional committee that lignin, with respect to industrial possibilities, holds a position like that held by

MANY USES

Dr. W. W. Skinner, of the Bureau of Chemistry and Soils, Department of Agriculture, in the above picture, is pointing out some of the products made from the lowly corncob. They include (1) a block of insulating material (2) a wax model of a corncob somewhat exaggerated in size (3) various corncob products in bottles (4) plastic material used for printing plates, etc. (5) silk dyed with material obtained from the corncob (6) insulating material for use in radio and other electrical equipment. The United States annually produces 35,000,000 tons of corncobs.

coal tar a century ago. That was an eye-opener, for the story of coal tar is not eclipsed by anything in the Arabian Nights.

Coal tar is the by-product of coal distillation in the manufacture of illuminating gas. Seventy-five years ago it was wasted in enormous quantities. Chemists discovered its master substances. They learned how to tear apart its carbon compounds, and rearrange them so as to form new compounds of great utility. In this way many new substances, possessing hitherto unsuspected physical, chemical and biological characteristics, were created. Mauve, the first coal tar dye, was produced by Sir William Perkin in 1856.

Eventually coal tar, in its raw state a sticky, evil-smelling mess, yielded perfumes, cool flavors and medicines, and also dyes, drugs, and explosives. Thousands of substances not found elsewhere, or not otherwise cheaply available, are now extracted from coal tar by chemical industries whose aggregate capitalization runs into the millions. That miracle will be hard to beat.

Like a Romance

When Doctor Skinner hinted it may one day be beaten by the miracle of the corncob, he was suspected of romancing. But skepticism soon changed into interest. As evidence of what the future may hold, Doctor Skinner showed the congressional committee three brilliant and perfectly fast dyes made from lignin in the Bureau of Chemistry—the first dyes ever got from a grain by-product. But dyes are not the only interesting or valuable things that the chemist gets out of the corncob. He gets cellulose, pentosans, adhesives, ethyl alcohol, glucose, xylose, and carbon. A briquette of soft coal can be bound with corncob adhesive.

It is not unreasonable, according to Doctor Skinner. to imagine the time when we may ride home from work in a car fitted with electrical equipment made from corncob plastic and painted with corncob lacquers, enter a home built with corncob board and covered with corncob shingles, exchange our work coat for an easy jacket made of corncob textile and colored with corncob dyes, seek an easy chair made with corncob products, read the evening news from a paper made of corncob pulp and printed with corncob ink, toast our toes before a fire of corncob briquette, and soothe the senses by smoking a corncob pipe.

Hidden Treasures

Lignin is the most promising source of new values from the corncob because, like coal tar, it is a complex carbon compound capable of being combined with many other substances. Its chemical composition, in other words, distinctly favors the hope of discovering in it new sources of wealth. Another of its recommendations to the pioneering chemist is its great abundance.

Lignin is an important part not only of corncobs but of straw, oat hulls, cottonseed hulls, and other cellular materials. It makes up from 20 to 30 per cent of the dry matter in such farm by-products. Today it is the greatest of all unutilized farm wastes. Tomorrow it may be worth more than the other parts of the plants in which it is found.

As yet lignin has yielded only dyes, albeit much better dyes than the first ones extracted from coal tar. But the chemist has only just begun the study of its possibilities. And already he is pretty confident that in lignin the world has been overlooking a big bet.

Other constituents of the corncob have already been made to deliver up some of their hidden treasures. Besides lignin, the corncob contains pentosans and cellulose. These sub-

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OKLAHOMA
Experiment Station

By Clement E. Trout

Editor, Oklahoma A. and M. College

WHEN the great plains area west of the Mississippi was settled, an island of territory was left vacant while the homesteaders occupied the surrounding land. This island was the Oklahoma Territory set aside by the Federal government for the Indians who were moved in from other states. When the good land in the adjacent states had passed into private hands, however, settlers began to demand that the Oklahoma territory be opened.

Finally in 1889 a large tract was opened to settlement in the famous run. By 1893 most of the unoccupied territory was settled. Unique in history is the sudden transformation of this large state from open prairie occupied by a few cattlemen and Indians to a settled state.

With the establishment of the territory in 1890, all public institutions had to be organized. Events moved fast and almost unbelievable progress was made in a few months. The Agricultural Experiment Station was begun as a part of this rapid development.

The Oklahoma Agricultural Experiment Station was authorized as part of the State Agricultural College by the first territorial legislature which met in 1890. The action also located the College and Station at Stillwater in Payne county. The land for the Station was selected in July, 1891; a director, Dr. James C. Neal of the

Florida Experiment Station, was elected in August; an agriculturist and horticulturist, A. C. Magruder of the West Virginia Station was elected in November; and the first land broken on December 2, 1891.

The land was virgin prairie sod. The state was just being settled and a multitude of problems faced the new Station. The first bulletin of the Station outlines some of the conditions as follows:

"The records of temperature, rainfall and sunshine for the Territory are too meager to be of much value; the soils have not been analyzed, and very few experiments made heretofore with fruits, crops or vegetables, hence it will not be practicable to follow a rigid program in a new and untried soil and climate.

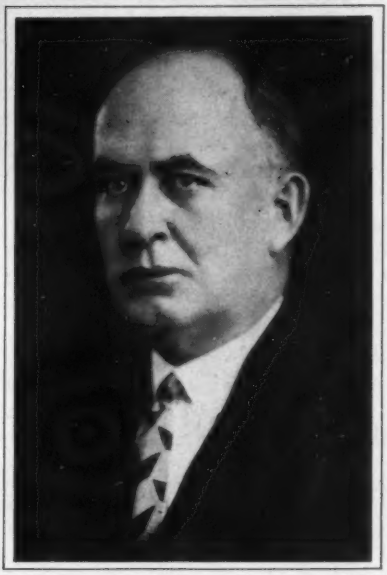
"The growth during one year of a few fruit trees, indicates a possible special adaptation of the Territory to orchards and certainly this one point deserves the prominence I shall give it, in planting, as soon as possible, three trees of every variety known to do well in similar latitudes and supposedly like climates.

"The soils of Oklahoma being so unlike those of adjoining States, the prairie grasses form a sod that it said to act peculiarly during the first years of cultivation, and it is a commonly received saying that no crop will ever do well on winter broken sod, or, as it is usually expressed, 'Winter breaking ruins the land.' "

Began With Virgin Soil

When Magruder began work he found 160 acres of land available, 120 acres of which had never been broken and 40 acres were "one and one-half years from the sod." The first work included intensive tests of varieties of tree fruits, 260 varieties of apples,

Cotton plots on the Experiment Station Farm, Station buildings in background.



The staff of the Oklahoma Agricultural Experiment Station.

RIGHT: Director C. T. Dowell.

171 of peaches, and others in proportion being planted; small fruits; grasses; and the staple crops, corn, wheat, oats, and sorghums.

Thus work began on the Oklahoma Station. Now there are about 38 members of the staff, 250 acres in the main station; and branch stations or cooperative work is carried on at 10 other points in the state. Emphasis has changed from the first attempts to find out what crops and varieties of crops would grow in the Territory to more fundamental lines of research. Housing facilities and equipment are now fairly adequate and more building is under way.

Dr. C. T. Dowell, the present Director of the Station has been in charge since 1921. Among the prominent men who have been directors of the station at some time are Henry G. Knight, now with the U. S. D. A., and John A. Craig, author of the well-known text-book on stock judging. In all, the Station has had nine directors.

While the Station has been hampered by lack of funds, the last session of the State legislature appropriated $40,000 per year for the work. The largest amount received from the State before this time was $17,500 per year. The Federal funds have also been increased. With this aid the Station has made more rapid progress during the past three years than in any other like period of time in its history.

Experiment Station projects now include work in Agricultural Econom-

ics, Crops and Soils, Animal Husbandry, Agricultural Chemistry, Dairy, Entomology, Home Economics, Horticulture, Plant Pathology, and Poultry.

Adapted Crops Developed

Among the important accomplishments of the Station have been the development of Darso, which is now one of the important sorghums, especially valuable in unfavorable seasons; and of Oklahoma Triumph 44, a variety of cotton that is rapidly gaining general distribution. Fundamental work on the soft pork problem done a number of years ago has been a contribution of national importance.

A number of projects are now in progress which promise to throw light on fundamental problems. The study of the factors which effect the toxicity of cottonseed meal, resulting in the discovery that heating wet meal under pressure seems to decrease the toxicity, may have far-reaching results for animal feeders. A study of the effect of iron on nutrition is giving results of wide significance.

Experiments carried on for the past three years to determine the most satisfactory way of preparing grain sorghums for hog feed have already shown that this dry-land crop can be made the basis for hog production on a large scale.

Pecans are native to Oklahoma and many farms have groves of the wild nuts. Improved methods of top working these old trees have been developed at the Station. Many farmers are following these methods and changing their native groves over into better paying varieties. In the aggregate this will mean many dollars to the farmers of the state.

While dairying is just gaining prominence in the State, the Oklahoma Station has done some work of national interest as that of the use of gelatine in ice cream.

Soil Tests Important

The oldest soil experiment at the Station is a continuous wheat test comparing manured and unmanured plots. The 1928 season is the thirty-third year for the test. Average yields on the two plots for the first 28 years are 21.31 bushels per acre on the manured plot and 12.58 bush-

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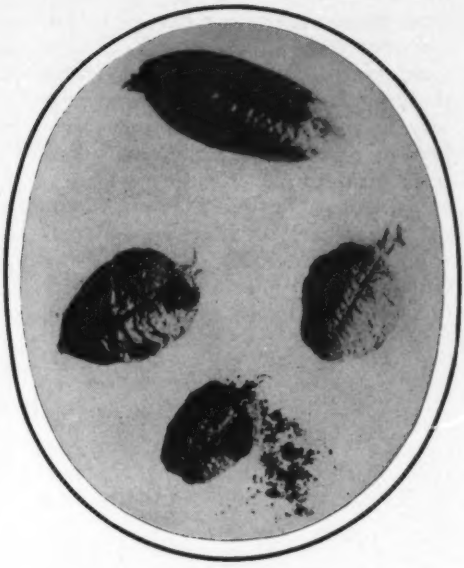
Steer feeding experiment results being announced at the annual feeders' day, 1928.

When the wheat head begins to form, the fungus grows very rapidly and absorbs all the food substance of each wheat kernel in the head except the outer coat. Finally it produces enough spores to entirely fill the kernels.



PROTECT YOUR WHEAT SEED *from* STINKING SMUT

By E. K. Walrath

Westminster, Maryland

STINKING smut of wheat, or bunt, is the worst disease of wheat in our principal wheat-growing regions. It is important wherever wheat is produced in this country, and it is estimated that the annual loss attributed to this disease amounts to 25,500,000 bushels.

Strictly speaking there are three classes of smuts—first: smuts similar to the stinking smut of wheat where infection occurs when in the seedling stage; second: smuts similar to the loose smut of barley, where infection occurs only when the plants are in blossom; third: smuts similar to corn smut where young growing plants may be infected by spores grown by diseased plants nearby.

Smuts of the third class can be controlled only by destroying the diseased plants as soon as they appear. Those of the second class, commonly known as loose smuts, are carried within the seed and can be controlled only by dipping in water hot enough to kill the

smut spore, yet not hot enough to kill the seed itself.

Stinking smut, or bunt, belongs to the first class, that is, infection occurs only in the seedling stage, and therefore it cannot and does not spread from plant to plant in the field.

The disease, in spite of control measures that have been known and recommended for many years, is very serious. The wheat grower may prepare a good seedbed on well-drained, fertile soil that has been abundantly supplied with a well-balanced fertilizer. He may sow the best seed that can be bought; he may have ideal weather conditions for a big crop, and yet stinking smut or bunt may rob him of his profits by injuring the milling quality and reducing yields. No method has as yet been devised to get rid of the decaying, fish-like odor of stinking smut. So tenacious is the odor that is imparted to the flour that buyers do not want smutted wheat. They grade it at the bottom of the scale as to quality and price and in many cases positively refuse to buy it or handle it for the farmer.

Control Methods

This disease can be prevented by heeding the control methods as developed by our agricultural experiment stations and the United States Department of Agriculture. Their recommendations are practical and if employed will limit or entirely prevent the enormous losses now suffered by wheat growers.

If some of the dust from a smut ball is examined under a powerful microscope, the stinking smut will be seen either as smooth or rough seed-like spores or germs. They are so small that there are enough in a single smut ball to infect every kernel in a measured bushel of wheat.

The spores of the stinking smut or bunt are scattered over healthy wheat in harvesting, threshing, cleaning, or seeding. They may stay dormant even for years on the rough surface of the seed. The same conditions of moisture and temperature in the soil that sprout the wheat also germinate the spores of this disease. A cold, wet soil, however, is most favorable to their development.

A wheat grower may have stinking smut in his fields and not be familiar with the disease, but at threshing time he will note a strange odor about the fields or barn. If this smut infection in the fields is at all serious, he soon finds kernels coming from the separator that look somewhat like wheat. They are, however, filled with black, greasy, vile-smelling dust. This is stinking smut. If his field infection is low, he may not know that he has the disease on his farm until the grain buyer detects the odor, or shows him the so-called smut ball or infected kernel in the screenings.

When the stinking smut spore germinates, it sends out very thin root-like threads. These grow into the small wheat seedling before the first shoot breaks through the ground. Once the disease is inside the tissue, the plant is doomed. The tiny root-like threads live on the plant and grow up within the stem.

When the wheat head begins to form, the fungus grows very rapidly, and absorbs all the food substances in each kernel in the head, except the outer coat. Finally it produces enough spores to entirely fill the kernels.

To control stinking smut in wheat, seed that is to be planted should be cleaned by a strong fanning. This removes the smut balls which otherwise might be crushed by the feed wheels of the drill, thus spreading the disease in the soil to the seedling plants. The cleaned seed should then be thoroughly treated with a copper carbonate dust at the rate of 2½ to 3 ounces per bushel. This dust should be well spread over the wheat so that every kernel is coated. More than 1,600 smut spores have been counted on a single kernel, which indicates the thoroughness with which the dust must be applied in order to be effective. Machines have been designed to do this

easily and cheaply. Home-made devices have been made with barrels mounted on standards. A mixing-board is inserted within the barrel so that when the barrel is revolved the grain is well coated with the copper carbonate dust.

Farmers treating grain for smut must be warned to treat the seed out-of-doors, or to wear a dust-mask or wet sponge. They should stand on the windward side of the machine and take time to be careful, because inhaling the poisonous dust will cause sickness.

Other precautions include checking up on the rate of seeding. Treated wheat runs slower in the drill. It should not be allowed to stand in the drill or become wet. Any excess dust should be cleaned out of the drill often, and the drill wheels rocked before starting.

There are other losses of the wheat crop which must be reckoned with. Vast areas of wheat are subjected to the ravages of the Hessian fly, and annually large areas suffer severe damage from winter-killing. Both of these robbers are possible causes of large losses ranging from 10 to 75 per cent of the crop.

The Hessian fly is best controlled by delaying seeding until after the fly-free date.

A heavy root system and good top growth enable the wheat field to catch and hold snow and resist winter-killing by rapid changes from freezing to thawing.

The use of fertilizer plays an important part in overcoming these two losses. Grain farmers very often use too little fertilizer for best returns on their investment. In fertilizing grain a farmer should fertilize for two crops —the grain crop and the hay crop which follows.

To obtain the highest yields and the best quality of wheat and the most

This wheat field in the Shenandoah Valley, Virginia, shows the effect of a fertilizer high in potash in safeguarding wheat against injury from winter-killing. The wheat on the left was fertilized; that on the right was unfertilized.

profitable crops of clover hay, right amounts of the right, high-analysis fertilizer must be used. Potash and phosphoric acid are essential for a good growth of clover. Lime should be used if the soil is acid, and the seed inoculated if clover roots previously grown on the land have not shown an abundance of nodules.

In the East

There are two chief wheat-growing areas in which fertilizers are used. One is in the East and includes Pennsylvania, Maryland, Delaware, Virginia, and West Virginia. The other is in the West and consists of Indiana, Illinois, Missouri, Ohio, and adjacent territory. The soil, systems of farming, and fertilizer requirements in each area are different. No one fertilizer recommendation is good for all soils.

On many farms in the eastern wheat-growing region, there is a big opportunity for the profitable use of fall fertilizers containing nitrogen, phosphoric acid, and the proper percentage of potash.

On the Coastal Plain (the area between the Piedmont and the Atlantic Coast) of Delaware, Maryland, and Virginia, are more than 2,000,000 acres of Sassafras soils. Wheat, corn, clover, and grass are common crops, but the yields of wheat are low. After 15 years of work, the agricultural experiment station of Delaware says that the wheat yields on these soils can be profitably increased by the use of fertilizers.

This experimental work shows that where no fertilizer was used on wheat the yield was 10.4 bushels per acre. When complete fertilizer was used, the yield was 23.3 bushels, but with a smaller amount of complete fertilizer, 18.5 bushels. A complete fertilizer, of course, means one that contains the three essential plant foods, nitrogen, phosphoric acid, and potash.

That all of these plant foods were necessary for wheat on this soil is shown by the fact that when nitrogen was omitted the yield dropped 6.2 bushels per acre; leaving out the phosphoric acid decreased the yield 8.4 bushels; without potash, the yield was 8.4 bushels less. Potash is needed on many of the Coastal Plain soils if good crops of wheat are to be grown.

With regard to quality, the results showed that variation in quality may be reduced from 103 per cent to 5 per cent by the use of the proper fertilizers.

The increased yield of clover from the use of a complete fertilizer on the wheat was 2,130 pounds per acre. When nitrogen and phosphoric acid only were used on wheat and the potash omitted, the increase in yield of clover that followed the wheat was only 409 pounds per acre. This shows the necessity for potash on these soils to produce good crops of clover hay.

The necessity for potash applies particularly to all sandy and sandy loam soils that receive only moderate amounts of manure, and all land that because of heavy cropping or lack of manure, has become depleted in fertility. All of these soils under these conditions should receive a mixed fertilizer containing from 5 to 10 per cent of potash, and the average application is 250 to 600 pounds of mixed fertilizer per acre.

On stock farms on some of the heavier silt and clay loam soils of the Piedmont where large amounts of manure are used, less, if any, potash will be required. On these heavy Piedmont soils, however, if large amounts of superphosphate alone have been used continuously, or on grain farms where little manure is produced, a complete fertilizer will give profitable results.

In the West

On many soils of the western wheat area, fertilizers pay on wheat, and have a very profitable effect on the clover crop which follows. This is shown by results of experiments conducted by

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UTAH *Knows Her* Onions!

By Guy A. Peterson

Madison, Wisconsin

THERE is a bit of old world romance connected with the onion seed industry in Davis county, Utah, for it was largely due to a simple discovery on the part of a missionary plant hunter in Spain that the profitable practice of producing certified onion seed was started in Utah. The story of the change from California seed to Spanish seed and finally to Davis county grown seed and the development of the Davis county onion bulb industry from a production of 13 cars in 1921 to one close to 700 carloads in 1927 was told to us by Wm. J. Thayne. Mr. Thayne is now the county agent at Provo, Utah, but for seven years was the agricultural advisor of Davis county.

W. J. Thayne.

"Although some onions have been grown in Davis county for many years," said Thayne, "the history of the modern industry dates back only to 1921 when E. E. Smith, one of our Bountiful farmers, spent the winter in California and learned about the Sweet Valencia onion that was being grown in the Golden state. Smith was one of our best onion producers as he had been growing a few for the local markets and had been securing large yields from our fertile lime soils. He saw the possibilities of growing a mild onion that would not only surpass the strong Giant Gibraltar in quality but would in addition produce a higher yield than could be secured in any other section of the United States.

"When Smith returned, we took the matter up with the truck gardeners of Bountiful. As a result they pooled their orders for 55 pounds of California seed which produced an excellent quality of sweet onion pronounced the best that had ever been grown and sold on the local market. As we had far more onions than could be disposed of locally, our growers formed a pool of their crop and agreed to sell it collectively. We appealed to the agricultural department of the Union Pacific railroad for assistance in finding an outside market, and they furnished us with a list of all the commission houses in the United States. The

Onion seeds are dried in crates.

Davis County Farm Bureau wrote to these possible markets, and a sample of the matured onion was sent to each firm. Letters that explained the merits, grade, method of packing, and method of shipping the Utah onion were also sent by the secretary of the Salt Lake Chamber of Commerce, the county agent, and the state commissioner of agriculture."

As a result of this advertising, the pool of 85 cars sold for the profitable net price of 85 cents a cwt. to the growers. That fall some of the bulbs were held over winter, and a start was made in producing home-grown seed when they were set out early the next spring. The beginning did not prove successful, however, for the yields were too low to be profitable.

Growers Incorporate

Early that winter Thayne called a meeting of the growers which resulted in their incorporation under the new Utah law permitting the formation of non-profit, non-stock organizations to protect their incorporators. One of the provisions of this law that would be an excellent addendum to many state cooperative statutes makes it a misdemeanor to spread false information about a cooperative enterprise.

The newly-formed cooperative ordered about 400 pounds of seed direct from Europe for the second year's planting. This was secured through Senator Reed Smoot who took the matter up with the U. S. consul in Spain. That year the 126 carload pool was sold through the association to the highest bidder at $2.25 per cwt. Because this was so profitable, onion growing was stimulated to such an extent that Utah was put on the onion map along with Idaho, Texas, and Washington.

In order to provide seed for the increased demands coming to the association, Thayne and Smith petitioned the president of the Mormon church to have one of Bountiful's onion growers, who was then on a mission in England, given a leave of absence for a month to tour Spain and France for the purpose of studying onion seed production in these countries. As the president gave his consent, George B. Mann Jr. left his missionary post to become a paid envoy of the Davis County Vegetable Growers Association. It was well worth the cost, for he assisted the organization in securing the second 400-pound shipment for the third year's onion planting and picked up many ideas that the members adopted to more than double their yield of onion seed.

Chief among these recommendations was the simple one of slicing off an eighth of an inch from the crown end of the onion bulb just before setting. This allowed many more sprouts to come through, thereby greatly increasing the number of seed stocks. It seems that the tough skin of the onions that will store well is strong enough to keep many of the sprouts from breaking through, but once these sprouts have started they will go on and develop seed stalks.

Reach Success

The first successful seed crop of any importance was harvested in 1925. Since then Utah has produced nearly all her own seed and exported much in addition, for it seems to be the consensus of opinion that this seed produces better onions than any seed the growers have been able to get in Spain.

Mayor Ernest Madsen of Bountiful told us that this certified, home-grown seed has resulted in very uniform crops of onions with average yields of over 900 bushels per acre for all the Bountiful growers. Madsen, by the way, was the first secretary of the onion association and is one of Bountiful's two bankers. The secretarial duties take much of his time, but he has been well repaid for it because his bank deposits have increased by more than fivefold since the organization was started.

Stephen Rhodes, a 4-H club onion grower at Farmington, succeeded in

producing 1,200 bags or 2,400 bushels from a single acre to break the world's record and win a scholarship to the Utah Agricultural College. Young Rhodes did not fare so well the next year, however, because his plot was flooded and the plants were scalded. There is a possibility, too, that the decreased second-year yield might have been due to a lack of readily available plant food. Most onion growers in other sections of the United States use liberal applications of commercial fertilizers, but Thayne says that thoroughly pulverized barnyard manure applied the year before the onions are planted has given satisfactory results for Davis county growers. The crop is a new one, so it is possible that there is enough readily available plant food for onions to last a limited time, but from all indications the point will soon be reached where it will be profitable to apply commercial fertilizers even to these fertile soils.

Madsen took us over to the farms of Wm. W. Winegar and Clarence Roberts, for these men who were Utah's first onion seed growers now produce more seed than is used in the entire Mormon state, in spite of the fact that Utah has become one of the leading onion states in the Union. Though they operate separate farms, their practices are very similar. They both keep up the high natural fertility of the soil with liberal applications of manure from the Salt Lake City packing center.

Nothing but globe-shaped, dark-skinned onions three inches or more in diameter that have been certified by a state inspector are used for seed production. The ground is put into excellent condition the latter part of March because the crown-sliced bulbs are set as early in the spring as possible, at intervals of three inches in rows 2½ to 3 feet apart. They are then covered to a depth of about two inches and irrigated up. As it takes about 170 of the 100-pound sacks or around 8½ ton to set a single acre, the initial bulb cost is no small item, amounting as it usually does to more than $400 an acre.

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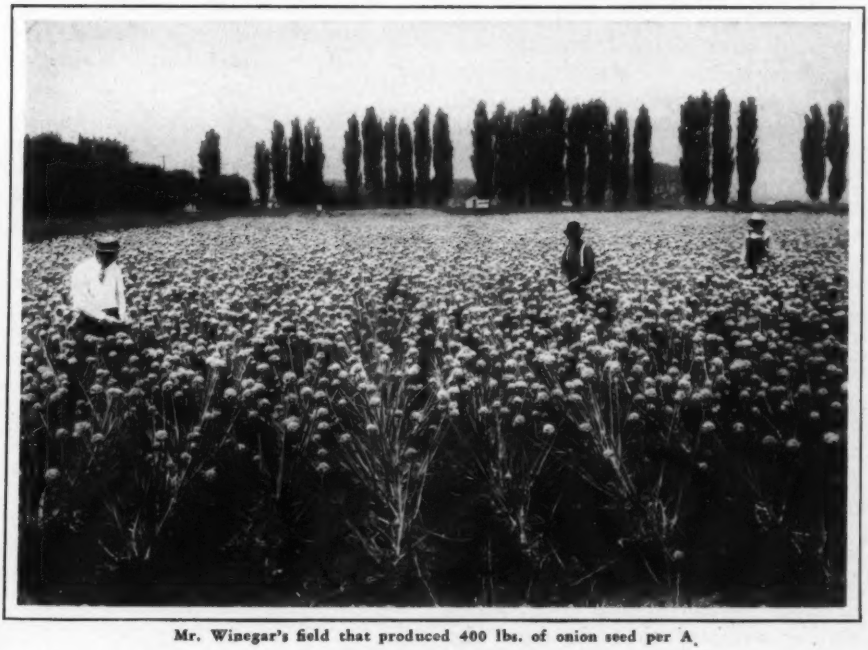

Mr. Winegar's field that produced 400 lbs. of onion seed per A.

Tomorrow's Farmer

By W. A. Freehoff

Waukesha, Wisconsin

RECENTLY the editor of a leading farm paper, who is himself a successful Ohio farmer, predicted that in the very near future a great many large corporations would spring up which would operate on a more extensive scale than is possible for the average farmer. This statement caused wide-spread comment and was quite enthusiastically assailed from many quarters. Somehow the idea has taken firm root in this country that the ideal farming system is one based upon a foundation of the small land-owning operator, and that centralization is impractical and undesirable.

Students of social and political economics do not believe that the British system of tenant farming is the proper thing for us, but apparently all is not well with the owner-operated farm idea. There is a tremendous political turmoil over the whole agricultural situation, which finds the corn belt in direct political opposition to the commercial East. Farmers of the Midwest have come to believe that unless they are given systematic political help they will be unable to operate with sufficient profit to make it worth while. Their leaders, when forced to admit that a great many farmers actually have accumulated a great deal of wealth and a large number are able to operate with profit, claim that the biggest material accumulations have been made because of the large rises in the value of land.

Regardless of what land may be worth today, if a farmer paid say half its present value 30 years ago, he is actually confronted with a very much smaller overhead than the man who invests on today's figures. Theoretically, of course, the two have the same overhead because if the man who bought 30 years ago were to sell now and put his money out at interest he would probably be doing better than if he continued farming.

The Transition

At the present time American farming seems to be undergoing transition from the development period of the day of cheap land, low taxes, and cheap labor to the day of high-priced land, high taxes, and expensive labor. When the transition is fully accomplished, we may well pause to give consideration to what the farmer will then be able to do. The actual mechanics of farming are different today than they were in the times of our forefathers, and there is a mechanical transition going on which indicates even greater use of mechanical power. Should this be the case, it is quite logical that the farms of tomorrow will be owned and operated by corporations which have money enough to swing such a proposition.

Take the one item of electricity. Today in my own community, and this is by no means as fully developed along this line as many other sections of the country, electrical current has become an everyday proposition. The farms are lighted by electricity and electric motors have almost totally displaced the stationary gasoline engine. The farm wife operates her household machinery by electricity and even does her cooking by means of "White Coal."

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Note the irrigation ditch cut through the peat soil after the potatoes were planted.

Record Potato Yields

By J. T. Rosa

California College of Agriculture

THE Delta section, near Stockton, California, has made a wonderful record in potato production—three "World's Record" crops in four years. Record "busting" began in 1924, when Mr. Fred Rindge produced 57,762 lbs. on a surveyed acre. In 1926 Zuckerman Brothers on another tract nearby grew 62,400 pounds on one acre, and in 1927 Mr. Rindge again broke the record with 64,700 pounds from a single acre. The significance of such yields can be seen from the fact that the average for the United States is a shade under 7,000 lbs. to the acre.

A few years ago I saw a statement that the Delta section of California was about through, as to potato growing. If such were the case, it is certainly showing signs of a healthy

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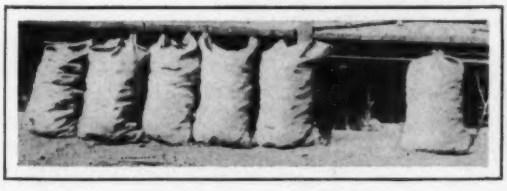
A three-row potato planter used on the Zuckerman ranch. Labor-saving devices decrease cost of production.



The result of an experiment to show the effect of potato disease upon yield. Right: 1 sack from mosaic-infected plants. Left: 3 sacks from healthy plants.

After being drained and then farmed under a system of balanced fertilizer treatment, hundreds of thousands of acres of originally barren peat lands in the North Central States have been made to produce as fine potatoes and delicious truck crops as any raised in America.

The Quality Era

By C. A. LeClair

St. Louis, Missouri

"WHY don't more people use leather garters?" I asked a haberdasher who attempted to sell me a pair of them after I had expressed dissatisfaction with the service rendered by the ordinary elastic type.

"They do!" he replied. "We are selling more of them every day. Still at present only one man in twenty is ready to pay the premium for the comfort and economy that the leather type affords."

People are more or less victims of habit. We become accustomed to paying a certain price for an article and more or less disregard the adages, "You get what you pay for" and "The best is the cheapest in the end." However, it is rapidly coming to that point, regardless of the field of endeavor, where special effort applied in the production of the highest quality goods pays the biggest returns, because people are quickly learning how to judge the best and demand it.

With the beginning of the twentieth century mass production had been an outstanding characteristic of American industry. Farmers naturally acquired the same habit. How many bushels of grain can I produce, or what is the cheapest way to produce a pound of pork, have been the typical aims of average farmers. The result was at times an over-production of nondescript stuff and a dearth of that for which people were willing to pay a premium.

As people prosper and their standard of living rises, their taste improves. Since 1920, throughout nearly the entire world, the standard of living has steadily advanced with the result that authorities now predict that

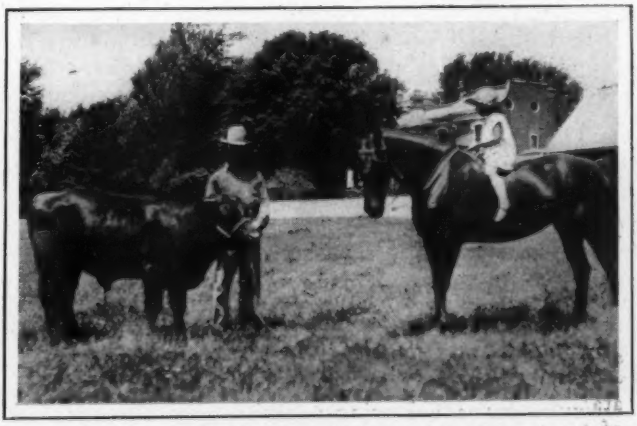
it will not be long until people, who, heretofore, were content with rye bread, will demand loaves made of wheat. This will, of course, increase the demand for wheat the world over with a corresponding tendency to increase the price per bushel. Coincident with the quality buying inclination of the public which has been constantly growing during the past decade an ever-increasing number of farmers have arisen to the occasion and find that the production of quality products is as contributory to their profit as is quantity production. They have observed that the market has not been, nor is it likely to be for some time, saturated with products grading the best.

Feeding Value

Most all the corn, much of the hay, and a large per cent of the grain and other crops, are fed on the farms where they are raised. Farmers themselves, therefore, can well afford to consider the feeding value as well as the yield of their feed crops. For instance, a yield of one and one-half tons of hay to the acre is considered satisfactory by most livestock farmers. Such a crop is ordinarily harvested with modern machinery and stacked in the field. The loss of feeding value due to exposure prior to feeding it is frequently overlooked, and the producer rests content with the mistaken idea that his per capita production is a maximum under his conditions. It may be that he does farm with profit under such a system of management. However, it is not uncommon for a neighbor, with very little more expense and effort to enjoy a harvest of a half ton greater yield of hay per acre which has as much as 50 per cent more feeding value. It does not take a cost accountant to figure out which of these farmers profits most.

That a ton of hay grown on one farm may be worth twice as much as the same weight of hay grown under less favorable conditions on a neighboring farm, is an established fact. This is because the plant food content of the soil has a marked effect on the composition of crops produced upon it. Poor soils generally grow crops deficient in mineral constituents, as well as in digestible nutrients. The relative value, therefore, of crops grown on good land, as compared with those raised on unfertile soil, can not be measured adequately with a scale, but the animals to which the respective forage is fed, respond proportionately. For example, when cattle are turned into a pasture, part of which has been fertilized previously, the animals instinctively graze the well-nourished grass. Again, a dairy cow fed for a week on hay grown on sour, run-down soil and then offered for a like period roughage of the same variety grown on fertile acres, invariably causes the dial of the milk scale to move toward heavier production.

It is well known that all soils are not equally fertile. On the other hand,



Animals respond to well-nourished grass and clover.

more farmers should realize that it is largely within their power to bring their fields to a maximum state of fertility through the use of commercial fertilizers. In fact, no other course is practical under present agricultural conditions. At present there is hardly a farm in the United States whose acres are not more or less deficient in some or all of the essential plant food elements, and for every dollar invested in their improvement, profitable returns can be secured.

Through selection and plant breeding, the yield of corn in the State of Wisconsin, for example, has been practically trebled, as compared with what the same acres yielded a generation ago. Similar results with this and other crops have been accomplished in other states. At the same time it is well known that the best strains of grain do not yield in proportion to their capacity in many localities and on some depleted soils they even fail to produce seed. The reason for this condition is that these elite varieties demand the treatment they deserve. Or, saying the same thing in another way, the agronomists are just a little ahead of the preparedness of farmers to make the most of their offerings. The element of quality is something which necessitates nursing and husbanding. Hence, the highest yielding, most nutritious crops, can be grown to best advantage only on land in a high state of fertility and maintained in that condition by enrichment with commercial plant foods.

Fertilize for Quality

Proof of the influence of fertilizers in improving the food value of crops is multiplying daily. For instance the yield and quality of the finer grades of canning peas have been materially improved through proper fertilization of the land upon which this crop is grown. Similarly, the sugar content of beets has been raised, and the palatability, color, and keeping qualities of fruits have been improved by a judicious use of balanced commercial fertilizers.

In some localities farmers have made admirable progress in the use of modern methods of efficient production. During the past 10 years thousands of acres of raw peat land in the state of Minnesota, which had been originally considered as just so much waste space, have been drained and fertilized so that the choicest quality produce reaching the market now hails from these lands. These peat soils at the outset were recognized as being inherently out of balance as regards their plant food resources. Hence, farming them without supplementary treatment with commercial fertilizers was not even considered. To the credit of the Minnesota Agricultural Experiment Station, which had by investigation worked out a fertilizer treatment to fit the conditions, goes the discovery of this great agricultural possibility.

The discovery of ways to use what were formerly considered marginal farm land in many of our northern states, is another quite recent achievement. Agricultural experiment stations in each of the several far northern states have taught their constituents how, through the use of quick-acting, soluble commercial fertilizers, it is possible to successfully grow quality crops in sections on the fringe of, or even beyond, their original habitat. Here, where the growing season is relatively short, the effect of fertilizer by actually increasing the resistance of growing crops to frost injury, together with hastening their maturity, is responsible for the extension of the staple crop culture area hundreds of square miles.

The full extent to which the use of commercial fertilizers effect our daily bread is almost unbelievable. Everyone knows how the wheat belt moved from the Atlantic Sea Board States in colonial days, westward, largely by reason of the lands on which wheat was first grown having become worn out through lack of supplementary treatment. Today the great wheat

states are the Dakotas, Minnesota, Missouri, Kansas, and Illinois. To be sure, wheat is grown to some extent in other commonwealths, but these states are holding their own in production and even increasing their yields. By using commercial fertilizers, farmers of the Central West have been able to make wheat production permanently profitable on the nation's last frontier of virgin soil.

Coincident with facilitating the permanence of wheat culture, has come the improvement of its quality by proper use of commercial fertilizers. The effect of fertilizers on the composition of wheat has been actually measured by scientists. In the great wheat state of Kansas, tests at the Moran Station showed that treatment of the land with superphosphate fertilizer not only increased the yield of winter wheat six bushels to the acre but that the weight per bushel of the wheat from the treated land was increased as much as three pounds.

Veteran millers in Missouri and Illinois have found that fertilized wheat in these states frequently weighs 10 and even more pounds to the bushel heavier than unfertilized wheat grown in the same neighborhood. They say it is possible to identify a load of fertilized wheat by the color and plumpness of the berries even before the grain is put to a test. However, the effect of fertilizer that counts most is the way it increases the gluten content of the wheat. Fertilized wheat makes the best flour and so it is not always the cook's fault if a cake falls.

In determining the full value of the farm products for human and animal nutrition, the amount of vitamins they contain is now also taken into consideration. Knowledge about the factors in growth which effect the vitamin content of foods is as yet relative-

To insure high quality grain it must be carefully shocked and promptly threshed direct from the fiield. If this cannot be done, it always pays to stack the grain until it can be put through the separator.

ly meager. However, it is of interest in this connection that some recent experiments conducted at the Ohio Agricultural Experiment Station at least indicate that wheat which had been generously fertilized with superphosphate or a complete fertilizer high in available phosphoric acid, was comparatively rich in vitamin "B." Vitamin "B" is known to stimulate the appetite and digestion, and hence contributes to good health.

A poor baker can take the finest ingredients and through careless mixing and baking produce an unpalatable loaf of bread. Similarly, a farmer can cut the finest prospective crop of alfalfa at the wrong time and harvest a very poor grade of hay. Three-fourths of the nutrients in alfalfa hay are in the leaves. Hence when the crop is cut in the bud stage and properly cured, almost twice as good hay is obtained as compared with that secured if the stand is allowed to mature to the seed stage when many of the leaves are shattered.

Unfortunately, weather conditions at harvest time and before the crop can be housed cannot be controlled. However, forecasts are available and other precautionary measures can be employed to largely avoid undue exposure and depreciation of a crop in the making. The marked effect of needless exposure in deteriorating agricultural crops is astonishing. For intance, the Colorado Agricultural Experiment Station found that alfalfa hay lost almost one-third of its weight after exposure to rain. Such a loss is even more costly than the mere shrinkage of weight indicates, for it is at the expense of the most digestible portion of the crop. Similarly, it was found at the Indiana Agricultural Experiment Station that corn fodder exposed to the weather in shocks for a little over a month depreciated one-fifth and more in feeding value. Hence, it should be realized that quality crops once obtained may, through carelessness, quite easily deteriorate. This applies not only to staple crops but also to everything raised on the farm.

It is a well-known fact that Florida citrus growers can produce a more delicious orange than California growers. Yet California oranges are consumed in larger quantities than the Florida product. This is largely because California producers overcome a handicap by providing that their product reaches consumers in a more uniformly graded and branded package. A visit to any large city market reveals the needless waste resulting from careless packing of perishable vegetables and fruits. All of this can be avoided to the ultimate reward of the grower.

There is, therefore, a fertile field open to farmers of the United States to increase the returns from their labors through the employment of methods which will provide for greater care in harvesting and more thorough grading of their products. The example of what farmers of Denmark have done in this regard should be proof of the fact that it will pay big to give as much attention to quality production as is now given to quantity production.

Quality Counts

Farmers who grow the best of everything are invariably the ones who are making good at present, and they too, will profit most in the future. To produce quality products, requires the use of quality materials. High-producing dairy cows are worthy of the best feeds. It requires the best commercial fertilizers to grow the most nutritious feeds. In other words, quality counts in everything that is bought as well as sold. If seed is of a higher germination test, a brand of fertilizer in better mechanical condition, twine of more even twist, it is well worth more than materials of lesser productive value. A fundamen-

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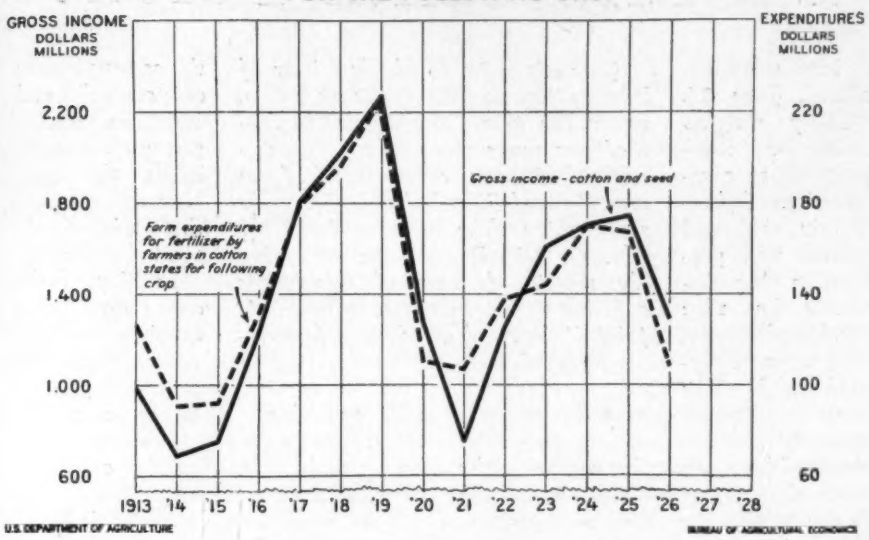
RELATION BETWEEN GROSS INCOME FROM COTTON AND FERTILIZER EXPENDITURES IN COTTON STATES FOR THE FOLLOWING CROP



Vice Versa

Cotton depends on Fertilizer Fertilizer depends on Cotton

By Frank George

United States Department of Agriculture

THE income from farm production in any given year in a large measure determines succeeding purchases, according to L. H. Bean, Department of Agriculture economist who has recently made a study of short-time inter-relationships between agriculture and business.

Stated differently, Mr. Bean declares, farmers tend to buy on the basis of income already earned rather than on the basis of prospective conditions or earnings. The fertilizer industry, for example, finds the farmer a good prospect or a poor one depending on what the harvest has brought. This is obvious from an examination of the accompanying chart in which the annual gross money income from the cotton crops since 1913 is compared with the estimated expenditures for fertilizer by farmers in the cotton states, these expenditures being made mostly during the planting period in the spring, while the income is derived mostly during the harvest of the preceding fall months.

The relationships would be still greater if income from other crops grown in the cotton states were included, but the comparison is regarded as sufficient to illustrate that the income from the major crop, cotton, practically determines the amount later spent for fertilizer.

Making Sands Fertile

HOWARD CITY, MICH., June 27. —Hay weights made here indicate that combinations of phosphoric acid and potash will produce a big increase in the yield of sweet clover on Plainfield sand. The tests were carried out on the Pennsylvania Demonstration Farm, two miles north of here, where for the past eight years the Hagerman Bros. have been demonstrating the Keystone rotation, which is especially adapted to farming sandy soils.

(Editor's note: In the last issue of BETTER CROPS WITH PLANT FOOD, *under the title "Making Sands Fertile," we ran a story of the Pennsylvania Railroad's experimental Farm near Howard City, Indiana. Since the story appeared, a clipping from the Chicago Daily Drovers Journal giving the results of some of this year's experiments has been sent to us. We print it herewith as a very interesting supplement to our story.)*

Thousands Visit Farm

The system was first projected by D. L. Hagerman, the first agricultural agent for the Pennsylvania railroad in this territory. After his demise his brother, B. O. Hagerman, was put in charge of the farm to carry out the rotation, which includes rye and vetch and also sweet clover. All the fields have been marled. During the last two or three years it has become increasingly evident that this soil, technically designated as Plainfield sand, responds also to applications of all three plant foods, but particularly potash and phosphoric acid on the alfalfa and sweet clover. Thousands of Michigan farmers trek to this farm every year to view the results of systematic, practical treatment.

Peas, Oats Seeded With Clover

During 1927 sweet clover was seeded with field peas and oats on a field that lies south of the buildings. This field has never been treated with commercial fertilizer. This showed up as a very good stand last summer when the county agents of central and northern Michigan met here to inspect the farm. It came through the winter in good shape.

In May of the current year, Gerrit Posthumous, the resident manager, laid out four plots to test the efficacy of applying phosphoric acid and potash alone and in combinations, as a top-dressing.

The green weights made indicate that neither one used alone produced the result that the two did when taken together in an 0-8-16 formula. The acre receiving no fertilizer produced 7,180.8 pounds of green hay, the acre receiving 350 pounds of 0-0-16 (pure muriate of potash) produced 12,262.2 pounds of hay, while the acre receiving 350 pounds per acre of an 0-8-16 produced 13,389.2 pounds of green hay. The dry hay weights will be computed later.

Results of Treatment

From the results it will be observed that straight acid phosphate depressed the yield, pure muriate of potash increased the yield 71 per cent over no treatment, while the 0-8-16 combination applied in a 350-pound dose increased the green hay weight 86½ per cent over the ground that received no commercial fertilizer.

Shoes were put on both the near and far ends of the cutter bar, thus cutting the sweet clover about eight or nine inches high, to promote a second growth. Weights will be made of the increase in second growth produced by the various fertilizer treatments.

Stacking Beans

By Y. P. Bhosale

Ithaca, N. Y.

MANY a time, in the fall, it so happens that the bean crop is ready to be hauled into the barn or to be threshed from the field when a shower comes, preventing the handling of the crop. Such rains make it necessary for the farmer to turn the beans, which have been pulled, quite often. This means more money spent for labor, not considering the loss caused by the actual damage to the beans.

There are farmers who plan to plant their bean fields to wheat if the beans are harvested in time. Frequent showers prevent the farmer from removing the beans from the ground until it is too late to sow the wheat. If he still sows the wheat, it is at such a late date that there is a loss in the yield due to winter-killing.

The McNaughton system of curing beans enables a grower to successfully harvest beans even under adverse conditions. The additional expense required to cure by this method is very slight.

In this method the beans are pulled when ripe with a bean puller and thrown into a windrow with a side-delivery rake, there being two pulled rows or four bean rows in a small windrow. As a general rule two of these windrows are thrown together, making eight bean rows in one large windrow.

When the beans are in windrows they are stacked four windrows at a time. Then across the field, between two of the large windrows, is driven a wagon carrying straw and some steel posts. The first post is set about 2½ rods in from the end and is followed by other posts at intervals of about 5 rods.

Steel fence posts that are seven feet long are used. They are strong and just about right in height. Poles can be used, but they must be very strong. It is best to use steel posts because they can be bought at a reasonable price, are easily set, and could be used for a long time and still have some value.

A post is driven into the ground and a forkful of straw placed around it. The straw is placed in such a manner

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Beans stacked like this allow early seeding of wheat.

What I *Did* *with* Waste Land

By T. S. Nored

Paris, Tennessee

TWO years ago, I purchased a small tract of land near my home. A part of this land was an old field, which had not been cultivated for several years, was considered worthless and unfit for cultivation, was grown up to briers and bushes, and was considerably gullied. It was sandy loam underlaid by a red clay subsoil, where erosion had left nothing but the subsoil.

I put in spare time through the winter cutting briers and bushes, filling the gullies with them, plowing off the banks and covering the brush until I could cultivate across them. My next step was to make three terraces across the hillside, with just enough fall from the center to each end to drain the water each way before breaking over and washing more gullies. Where my terraces crossed the filled-in gullies, I built the terrace higher and stronger.

I was now ready to prepare for a crop. I double-cut the land with a disk-harrow, broke it deep with turning plow, disked again, and harrowed until a fine seed bed was made.

Part of the piece was planted to corn, fertilized with 200 pounds of a 10-4-4 fertilizer to the acre in the drill. The balance which I had cleared off was set to sweet potatoes, fertilized with 400 pounds of a 10-4-4 per acre. I finished cleaning-up and planting the balance of this field to cowpeas in July.

At the last cultivation of the peas, on the 20th of August, rye, hairy vetch, and crimson clover were sown for a winter cover crop and to plow down in the spring, with no extra expense of preparation of ground.

At the last cultivation of the corn, cowpeas were sown broadcast. The corn was cut and shocked, the peavines disked into ground. Rye, vetch, and crimson clover were sown also on the potato ground.

Instead of a field of bushes, briers, and gullies, I now have a field well terraced and covered with green crops to plow into the soil next spring to increase its fertility and the yield of succeeding crops.

Grows Fertility

All available manure is being used to increase the growth. The value of the fertilizer not consumed by the crop is plainly evident by the increased growth of cover crops in potato, pea, and corn rows. Not only am I growing fertility to plow down next spring, but am conserving the fertility by preventing it washing and leaching out of the ground with the winter and spring rains.

I did not expect a large yield, until the ground was put in condition to produce it, but the yield was sufficient to leave a small profit to say nothing of the increased value of

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Lowell Moffitt in front of the seed corn house made by combining an old tool shed and hog-house.

The Rise *of a* Hoosier Corn King

By K. E. Beeson

Soils and Crops Department, Purdue University

ONLY a few years ago Lowell Moffitt was a grain and livestock tenant farmer down in Rush county, Indiana. He was a good farmer, it's true, but was unknown outside his own neighborhood. Today he is Indiana's latest corn king, by virtue of winning the 1928 State Corn Show, and few honors in the Kingdom of Corn exceed that of winning the Hoosier Show where competition is as keen as at the International Hay and Grain Show in Chicago.

Very few "Kings" have had a more phenomenal rise to this glory than Mr. Moffitt. Like most livestock farmers of his territory he was feeding both cattle and hogs a few years back when prices dropped, and consequently faced the problem of making his farming operations profitable by changing his system. Always a lover of corn, though not a specialist like some of his neighbors, he turned seriously to the task of studying this leading Hoosier crop. With a start of well-bred, high-producing corn, the addition of the right fertilizer to his black soil, and the use of sweet clover in rotation he was soon producing yields that made him a constant threat in the State Five-Acre Corn Contest, with official yields ranging from 111 to 125 bushels per acre during the last three years. However, like all lovers of corn, he was not content with yields alone, but took up the finer study of improving his type and developing a seed-corn business. Naturally this called for equipment for properly storing and drying his corn. But here a stumbling block developed in his plans

that might have stopped a less determined individual. His landlord's interest in corn, hogs, and cattle did not carry over to the seed-corn business, and no properly constructed seed house was available.

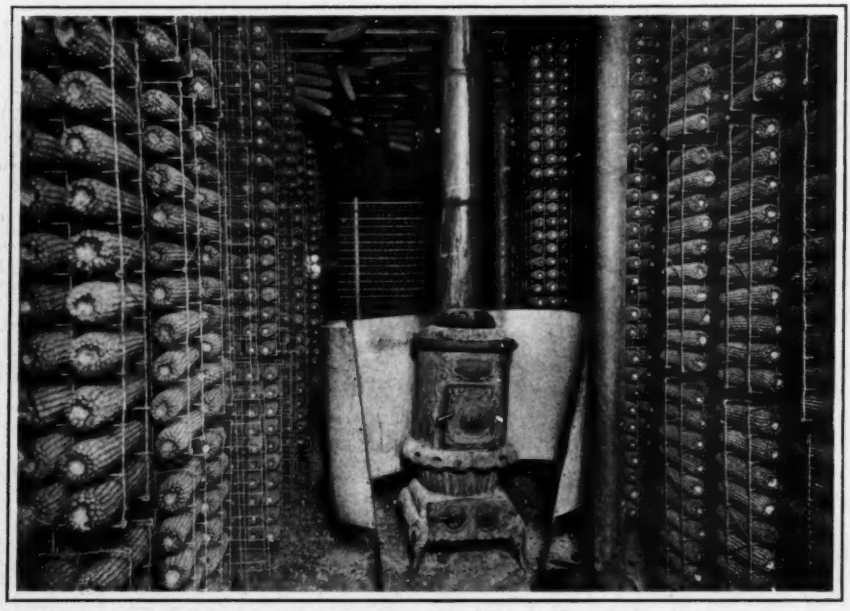
These stumbling blocks sometimes inspire determinaton and such was the case with Moffitt. He took stock of the farm buildings and decided that some of his machinery could be stored in the barn and that less space was needed for his hogs. Combining two buildings that were thus made available, adding a concrete floor and walls, battening the cracks, and making the building rat proof soon made a place that would store 500 bushels of seed corn. The addition of several windows cared for the necessary light and ventilation, and an old stove surrounded by sheet metal provided enough heat to properly dry the corn and prevent freezing. Wire racks suspended from the reinforced crossbeams offered ideal means of storage, for no two ears touched and air circulation was excellent. And so an inexpensive home-made seed house was developed.

More than ordinary care must be exercised in producing a crop of corn that is primarily intended for seed purposes. The sweet clover provided the organic matter and a part of the nitrogen needed by the corn crop, but Mr. Moffitt took no chances of his corn starving for lack of plant food. Liberal fertilization ranging from 200 to 400 pounds per acre of 0-10-10 were broadcast before seeding, and 100 pounds of 2-12-6 were applied in the row at planting time, while adequate cultivation was given during the growing season.

The real burden for the seed-corn producer came with the harvesting of the seed crop. Shouldering a grain bag, Mr. Moffitt spent days in his fields when the corn was properly matured, but before it had been frosted, gathering the proper type of ears from the right kind of stalks.

No seed-corn man spends valuable time during the fall and winter in

(*Turn to Page* 50)



An old stove furnished steady heat. Wire racks made excellent storage facilities to promote drying.

Pictorial

TRANSPORTATION
OLD and NEW

Aunt Sammy of the Department of Agriculture Radio Service and the plane in which she flew with Colonel Lindbergh. Aunt Sammy does the radio home economics stories for the Department and is editor of the Radio Cook Book.

The photograph below shows how we travelled before the radio and the aeroplane were ever thought of.

Right: It is the woman who works on the farms of Central Russia. This photograph shows a peasant woman cutting wheat.

Left: Dr. P. H. Dorsett, one of the plant explorers of the Department of Agriculture, took this picture in China. The Chinese woman is cutting pumpkin into long strips for drying. The pumpkin is mounted on a spindle and turned round and round by means of a stick placed at an angle at the bottom of the pumpkin. The cutting is done with a small tin knife as the pumpkin is rotated.

Mules in tandem on a country road in Spain, pulling a heavily laden cart. Their driver walks beside the load.

Above: Colored boy and old gray mule—a good combination for growing cotton.

Right: An old negro mammy coming home from the village store.

Below: Going in town on the weekly day of rest.

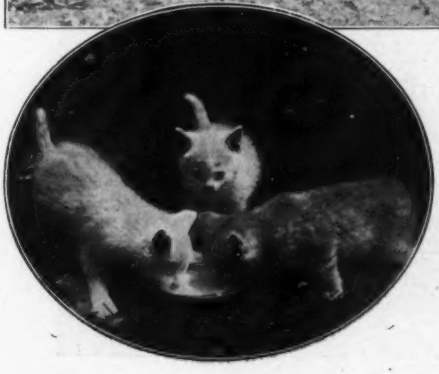
Robert Holt, of Remington, Ind., in his mother's flowers.

Alice Woodling, 4-H Club girl of Warsaw, Ind., giving a demonstration at the Club Round-up at Purdue.

John Knight of Grayson, Ga., with a large citron.

Dorothy Shelby of Lafayette, Ind., feeding goldfish in a lily-pool.

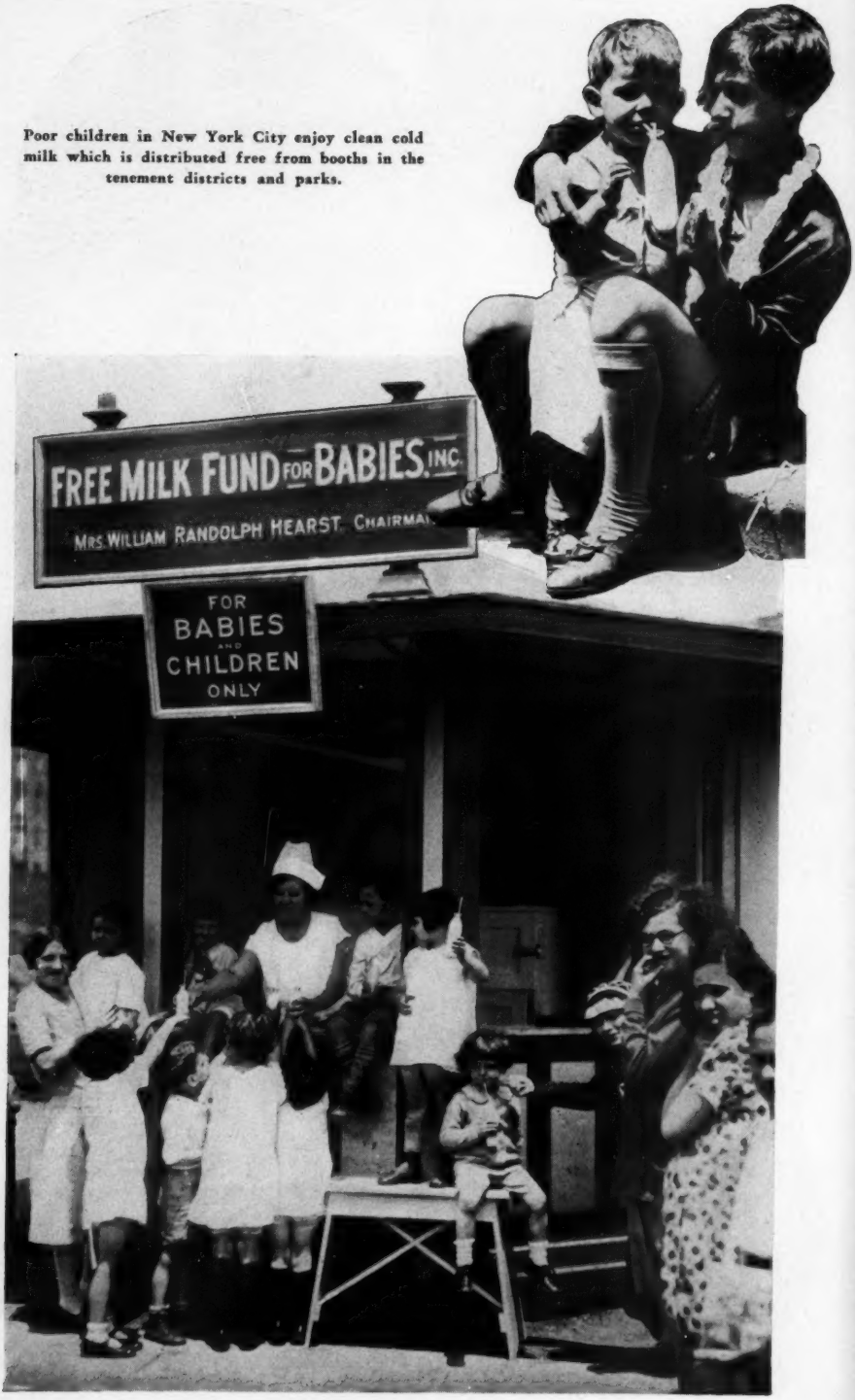
Bob-white and the plowman are mutually friendly. Aside from the fact that this little bird goes well on toast, he is a great aid to the southern farmer in the destruction of insect pests that destroy crops.



Above: A log cabin in the foothills of the Blue Ridge Mountains, typical of thousands of homes in the back country regions of Virginia and West Virginia.

Left: "Meow! Meow! Will there be any left for me?" asks the kitten in the center.

Poor children in New York City enjoy clean cold milk which is distributed free from booths in the tenement districts and parks.



The Editors Talk

"The truly quaint materialism of our view of life disables us from pursuing any transaction to an end. You can make no one understand that his bargain is anything more than a bargain, whereas in point of fact it is a link in the policy of mankind, and either a good or an evil to the world."

—STEVENSON

Prosperity Without Profit

Some of our British business cousins came to America recently to study our business methods. They saw; they went; they said a good many things, mostly challenging things. Among such was the report that few business concerns in America were making any money. One phrase occurs often in their report, "prosperity without profit."

Commenting on this report, Jesse Rainsford Sprague in the June HARPER'S admits that there is a "shade of truth" in this finding. Continuing, the writer points out that a continued struggle for increased sales volume with little regard to the cost is attributed as the chief cause of prosperity without profit. The question is asked, "Why do business men in great numbers set up stiff increases in sales volume each year?"

Too often apparently internal adjustments within the business, to insure maximum profit, are sacrificed to the god, "Increased Sales Volume." That all business all the time has to deal with changes of all sorts and types, seems to be overlooked. Adjustments have to be made to meet these changes. Business men in the agricultural world particularly have to meet violent changes and conditions.

As an example of the short-time change, prices of farm products fluctuated violently. In the Fall of 1926, cotton was 10 cents a pound; in the Fall of 1927, 22 cents.

A striking instance of a long-time change is the agricultural depression that has lasted seven years, a period in which the farmer did not receive his share of the national income. Another example, from 1900 to 1920, farm land values increased; thus farm mortgages were a very safe form of investment. From 1920 to date, the general trend of farm real estate has been downward. Such changes affect all business groups, in the first instance, of course, those who do business directly with the farmer.

Business organizations are forced to make internal as well as external adjustments in order to meet these changes. It is the internal adjustments that are too often sacrificed, but whatever business as a whole is doing, it is very gratifying to note that it is in this field that the fertilizer industry is now doing much of its best work. As an example, in recent years costs of production have been decreased by the installation of labor-saving machinery. In 1919, the average tonnage of fertilizer produced per wage earner in the industry was 261 tons. Four years later, in 1923, it was 357 tons. The volume of output per wage earner had increased 37 per cent, while the total fertilizer tonnage in these two years

was approximately the same. This is due largely to an increased use of machinery. In 1919, the horse power per wage earner in fertilizer plants was 4.8. Four years later it was 8.7. This is an increase of 81 per cent. The increase in volume of production per worker was made possible by the greater use of power equipment.

Not only is labor being used more economically, but the code of trade practices, the work in cost accounting to determine the cost of manufacturing fertilizers, the higher analyses of fertilizers sold to save freight, and the better analyses calculated to give the farmer a greater profit, are all striking evidence of the work being done in this field.

In many lines of industry, the cost of selling goods and promoting new sales, such as advertising, etc., are now greater than ever before. It is probably in these fields of distribution and promotion that internal adjustments are yet most needed.

In contrast to much of the business done in America, British and European business is often carried on in a field of fiercer competition. Natural resources are more limited; home markets more limited; the labor supply, in greater abundance, must be absorbed; and sales volume does not, as a rule, readily leap upward. It requires careful planning and hard work. Stark realities have to be met. Internal adjustments, often from the broadest social viewpoint, are essential, if business is to survive.

It is in this field of internal adjustments that American industry has probably something to learn from our visiting business friends. Possibly after all there was a shade of truth in what our British cousins reported to their stockholders about their trip to America. It is clear, however, that in one basic American industry at least, the shadow of truth in their criticism is fast disappearing under the light of a greater vision.

"The requirements of a good farmer are at least four: The ability to make a full and comfortable living from the land; to rear a family comfortably and well; to be of good service to the community; to leave the farm more productive than it was when he found it."—L. H. BAILEY.

Fertilizer Handbooks 1928

Adjustments of external and internal conditions being the prime requisites of any profitable and progressive business, it follows that any worth while adjustment can only be made on the basis of facts. The more complete and comprehensive the facts, the quicker and better adjustments can be made.

We badly need comprehensive facts regarding the fertilizer industry from a great variety of viewpoints. For this reason, the two fertilizer handbooks for 1928 are valuable references.

THE AMERICAN FERTILIZER HANDBOOK for 1928, the twenty-first edition of which was published recently, is a substantial contribution to the needs of the industry. Outstanding among such information in the handbook is the data giving the sales of fertilizer in the United States by states and geographic

regions for the years 1920 to 1927. This information is often useful particularly in planning advertising and distribution policies which are profitable fields of further adjustment.

Another important section is on "The Fertilizer Material Markets." It gives the trend of the cost of materials. Data on the production and imports of fertilizer materials are given, also an interesting discussion on the agricultural situation. The data on fertilizer materials is very complete, and is a great help in unification and definition of the terms used in the fertilizer trade, thus helping to avoid confusion. The handbook also contains 17 directories which when needed are badly needed.

A section on the work of the executive officers and the Soil Improvement Committee add a comprehensive viewpoint regarding the work that is being done by the National Fertilizer Association. The state fertilizer laws are always useful.

Many people will read with interest the section on fertilizers in Continental Europe, which covers a discussion of the fertilizer developments in about a dozen important countries.

In the South, the 1928 YEAR BOOK has been prepared by the Commercial Fertilizer, Atlanta, Georgia. While smaller than the AMERICAN FERTILIZER HANDBOOK, it contains an excellent record of all fertilizer activities in 1927, the present outlook, and the record of a busy year for the National Fertilizer Association. The work of the Soil Improvement Committee, Southern Division, is well recorded, also the work of the Northern Division. New fertilizer materials are discussed, especially the newer nitrogen fertilizers. The handbook contains several important directories. It is of particular interest and value to the fertilizer trade in the South.

Both books are well printed and indexed. They should not only be readily available, but the contents should be well known to every executive in the fertilizer trade.

"Cooperation is not a sentiment—it is an economic necessity."

As It Came to Us

You have a dollar. I have a dollar. We exchange dollars. Profit—none!

You have an idea. I have an idea. We exchange ideas. Result—we both have two ideas!

Take for example the extension man and the fertilizer dealer. Why not exchange ideas with the local fertilizer dealer? He is an important man, and in the past has been too much ignored, rightly or wrongly. He is the man who often determines the kind of fertilizer the farmer uses.

In many sections, superphosphate alone is recommended for alfalfa, but it is a fact that alfalfa takes four times as much potash from the soil as phosphoric acid.

It is a fact that from the Atlantic to the Pacific there is an increasing interest in the proper fertilization of alfalfa with phosphates and potash. Why? Because it has been found to pay.

Does the local fertilizer dealer know this? Does he know what potash starva-

tion looks like on alfalfa? Does he ask the farmer he serves if he has seen it? Does he know who is growing alfalfa? Does he know that proper fertilization prolongs the life of alfalfa and saves expensive reseeding?

Now turn around. Do people realize the difficulties of the dealer in finding time to advise the farmer? Do we know how much trouble he has with competition and in collecting his accounts in hard times? Do we know fully his side of the day's work?

In trading it is necessary to exchange dollars.

But it is also profitable to exchange ideas.

We are too prone to find fault; let us look for some of the perfections.—SCHILLER.

The Blues

The blues can apparently be either a dance or a mood. The prime function of the blues as a dance supposedly is to dispel the blues as a mood, but alas, not at Yale!

It seems there is a "Yale Blues" and it seems further that some one has carelessly given the impression that Yale as a university is responsible for the blues as a dance. Was there ever such a lamentable situation? No wonder that many of the learned students of Yale seem to be sad about it.

At any rate, it will be no fault of the "Yale Daily News," a student newspaper, if this grave injustice does not cease, for the editor of the *Yale Daily News* has dutifully and hopefully written a most explicit letter to the editor of the *Times* in London.

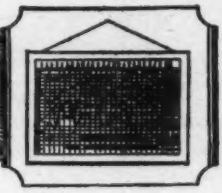
The letter assures that part of the highly respectable and dignified public of Britain that peruses the *Times* after its breakfast that Yale University "assumes no responsibility for the Yale Blues." "Yale," the letter continues, "is a self-respecting, educational institution, such as Oxford or Cambridge, and not a cheap dance hall."

But why pick out the London *Times*? The ecclesiastical and county public that read the *Times* are not the people one usually associates as indulging riotously in the blues, whether of the Yale variety or any other sort. The *Daily Express,* perhaps, would have been a better medium, or why overlook the popular friend of the people, the *Daily Mail*?

At any rate, let us proclaim as plainly as this type can do that Yale should be respected as one of the leading universities, or as the editor says, "as a self-respecting, educational institution," and that Yale does not assume any responsibility for the blues as a dance. They are apparently too busy dispelling the mood.

He who every morning plans the transactions of the day, and follows out that plan, carries a thread that will guide him through the labyrinth of the most busy life. The orderly arrangement of his time is like a ray of light which darts itself through all his occupations. But where no plan is laid, where the disposal of time is surrendered merely to the chance of incidents, all things lie huddled together in one chaos, which admits of neither distribution nor review.—VICTOR HUGO.

AGRICULTURAL DEVELOPMENTS



By P. M. Farmer

THE SEVEN VEILS OF DAIRYING

There are seven big problems that obscure success in the dairy industry today, in the opinion of K. L. Hatch, of the University of Wisconsin, who spoke recently before the American Dairy Science Association. He says more research should be directed toward the solution of the following problems: Economy of production, herd testing, recognition of quality, establishment of a new set of standards for dairy products, better utilization of dairy products, packaging of cheese, and the use of electricity on dairy farms. These are all interesting to both producer and manufacturer. In research, he says, more attention should be given to labor costs, dry cow expenses, depreciated herd costs, bull costs, and capital charges.

BIG EGGS MEAN BIG CHICKENS

The bigger the egg the bigger the chicken, according to results obtained at the New Hampshire Agricultural Experiment Station. Not only were the chickens bigger when hatched, which was to be expected, but those from the big eggs were bigger at five weeks of age. This leads to the conclusion that it is important to select large eggs for hatching unless you are growing bantams.

The same station has shown that fish meal and codliver meal, as well as codliver oil, are very effective in the prevention of rickets in chickens. Five per cent of fish meal along with the regular rations prevented rickets; two per cent of codliver oil and the same of codliver meal were equally efficient, and the birds grew better than those on the fish meal.

NINE FERTILIZER RATIOS FOR OHIO

All fertilizer needs in Ohio, according to the Ohio State University, have been met by nine standard plant food mixtures, and a leaflet descriptive of them has been issued. The agronomists with the assistance of fertilizer manufacturers have worked out these mixtures to get away from the former confusion and unnecessary expense resulting from the large number of fertilizers of various analyses that were little different from each other. This action on the part of Ohio is one of the results of a conference of agronomists and fertilizer manufacturers held last fall in Chicago.

COCONUT PORK

Farmers on the little island of Guam are feeding hogs on the meat of coconuts. The agricultural experiment station of the island says 100 pounds of gain can be obtained for a feed cost less than $3.50 whether the fresh coconuts are fed or coconut meal. For a time it looked as if coconut scale would stop the production of this crop but it has been controlled by the predatory black ladybird beetle and now the old export crop is doing well and there is a surplus for pork making.

NEW HOG TATTOOING SYSTEM

A more convenient system of tattooing hogs so that the carcasses may be readily identified in packing plants has been devised says K. W. Stouder of Iowa State College. Many counties where tuberculosis eradication has been completed have adopted the new marking system. The new plan is based on the use of five letters. The first indicates the State, the second the county, the third the township, the fourth the section in the township, and the fifth the farm. The second letter is assigned in the order in which counties are accredited as being tuberculosis free and a bar over this letter indicates the second group of counties after the alphabet has been run through and a bar under the State letter indicates the third group of counties and a bar above and below distinguishes the fourth group. Under this plan each section of land is divided into 40-acre areas, each of which has a letter which remains its designation permanently. When a man moves to another farm the designation for his hogs will change.

OLD ALFALFA FIELDS

There are many fields in Windsor county, Vt., says H. W. Soule, county agent, that are from 8 to 12 years old and still going strong. One grower last year cut a big load from a quarter acre that was planted in 1917. How long will alfalfa live in this country and particularly how long will it live and produce good crops? In its native country it is said to live for generations.

"BOOTLEGGING" CULL APPLES

Apple growers should not sell their culls to unscrupulous dealers, says R. S. Marsh, horticultural extension specialist of Illinois. Many buyers of cull apples, he says, distribute them to cities where they sell at prices near those received for good fruit and he contends a carload of culls will do more damage in glutting the market than 50 carloads of good fruit. This year, he says, the "bootlegger" may be worse than ever because there is prospect for an excellent fruit crop. Swat the culls, he says, and get a better price for good fruit.

PHOSPHORUS LACK MAKES BONES BREAK

Clover and alfalfa hay are always thought of as good bone builders as well as feeds rich in vitamins, but, says Dr. C. H. Eckels, of the University of Minnesota, they do not supply enough for livestock pasture on soils deficient in phoshorus such as are found in parts of western Minnesota. He says cows on such lands suffer so badly from this lack, even though receiving as much alfalfa hay as they could eat, that sometimes their bones break. Alfalfa grown on such soils contains less phosphorus and when such hay is fed, the deficiency should be made up by feeding a mixture of equal parts of bone meal, ground limestone, and salt. Dr. Eckels says added calcium does not help in such cases and may really prove to be a disadvantage. Apparently livestock growers must feed mineral mixtures according to the soils on their farms.

TRYING IT ON THE CORN BORER

Illinois is trying to find out what the corn borer will do when it gets there in force. The Experiment Station has planted 40 varieties of Illinois corn near Toledo, Ohio, and will note what the borer does to them. Among the varieties are some representing each section of the State. These variety tests are a continuation of tests started in a small way last year at Monroe, Mich. It is to be hoped someone will soon find a variety that the c.b. can't chew.

Pineapples

By Chas. A. Beatley

Habana, Cuba

SOME years ago, in the minds of many an uninitiated Northerner, pineapples grew on trees. In these days of rapid transportation by sea, land, and air, and consequent intercourse between even distant lands, such an idea is hardly tenable. The pineapple is no stranger today in most parts of the world and is known and relished as an article of diet in many countries far beyond the confines of its native habitat. There is still much of interest in pineapple culture to be told the reader who has never seen the crop.

The pineapple, known scientifically as Ananas Sativa, is indigenous to America. The true fruit is described botanically as a berry. The fruit as known to agriculture and commerce is a compound fruit made up of many individual berries. Instead of being separated in familiar form, these are fleshy and crowded together to form a seemingly single fruit at maturity. In many varieties the black seeds can be readily separated from the flesh of the florets.

Not only is the pineapple frequently classed among the best of tropical fruits, and a well-fertilized and properly matured pine is certainly a delicious morsel, it also possesses certain dietetic and medicinal qualities, to say nothing of culinary virtues that place it almost in a class by itself. The juice of the fruit is recommended by many authorities in the treatment of cases of indigestion and dyspepsia.

The pineapple was originally a native of Central America, but is now grown to more or less extent throughout the tropical world, and is cultivated commercially in Florida, the Hawaiian Islands, India, Australia, and the West Indies. Cuba alone exports annually a million and a quarter crates to the United States.

There are a number of varieties, some of which are not classified to any advantage since the same varieties in differ-

ent countries are known under different names; however, the generally recognized varieties known commercially are the Red Spanish, the Smooth Cayenne, Pina Blanca (known also in Cuba as Criolla), and the Cabezona.

The Red Spanish is the hardiest, the best shipper, and is best known commercially in the United States.

The Smooth Cayenne is large and of very fine quality. The plant is spineless, therefore, less objectionable in the work of cultivation and the picking of the fruit. It is grown extensively in Hawaii. It gives large discs when sliced and is used principally for canning. The fruit is a poor shipper and will not carry except under refrigeration.

The Cabezona, which in Spanish means a large head, is the largest known variety, weighing as much as 25 lbs.—12 to 15 lbs. is very common. This variety does not succeed well under all conditions. Even in Porto Rico, where it appears to thrive best, it succeeds in a comparatively small area.

The Pina Blanca or Criolla is grown in Cuba to a small extent for home consumption. It is very juicy, but has little flavor and does not carry well.

A curious minded person might ask the question, "Why is this apple called a pine-apple?" As to historical records there is probably no data that would definitely answer the question. The presumption, however, is that it is called a pine due to its shape and outward appearance, resembling that of a pine cone.

The stem is covered with leaves, arranged in whorls, and is supported by the attached roots. The margins of the leaves of most varieties are covered with spines; the Smooth Cayenne is an exception, the margins being smooth. At a certain period in the life of the plant the flower head, on which the fruit develops, appears on a stalk which is a direct elongation of the plant stem.

The pineapple is propagated by rattoons, suckers, and slips from the mother plant. When the fruit is matured and cut, these parts are severed from the main plant stock and set out. Roots soon develop directly in the soil, and if the new plant is good sized and

(*Turn to Page* 47)

Photo shows yield of second picking of pineapples from:
Plat 1 (5-10-10, 250 lbs. per 1,000 plants) Yield: 480 fruits.
Plat 3 (5-10- 0, 250 lbs. per 1,000 plants Yield: 280 fruits.

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture and the State Experiment Stations relating to Soils, Fertilizers, Economics, Crops, Crop Diseases, and Insects. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

"The Action of Aluminum, Ferrous and Ferric Iron, and Manganese in Base-Exchange Reactions," Agr. Exp. Sta., Tucson, Ariz., Tech. Bul. 18, *Feb.* 1, 1928, *O. C. Magistad.*

"Effect of Phosphorus in the Form of Acid Phosphate Upon Maturity and Yield of Lettuce," Agr. Exp. Sta., Tucson, Ariz., Bul. 121, *July* 15, 1927, *F. J. Crider.*

Soils

Soil erosion as a national menace is ably and intelligently discussed in a new U. S. D. A. Circular, 33, by H. H. Bennett and W. R. Chapline. Estimating that more than twenty-one times the amount of plant food removed from soils by the crops annually is lost by erosion, the authors stress the seriousness of the situation with typical instances of great losses all over the United States. The circular is exceptionally well illustrated and makes a splendid text-book on this problem of soil management.

"Alkali Soil Studies and Methods of Reclamation," Agr. Exp. Sta., Tucson, Ariz., Bul. 123, *Jan.* 15, 1928, *P. S. Burgess.*

"Crop Yield from Illinois Soil Experiment Fields in 1927," *Agr. Exp. Sta., Urbana, Ill., Bul.* 305, *Apr.*, 1928, *F. C. Bauer.*

"The Soils of Bowie, Denton, Freestone, and Red River Counties," Agr. Exp. Sta., College Station, Tex., Bul. 375, *Jan.*, 1928, *G. S. Fraps.*

"Irrigation Requirements of the Arid and Semi-Arid lands of the Missouri and Arkansas River Basins," U. S. D. A., Washington, D. C., Tech. Bul. 36, *Mch.* 8, 1928, *Samuel Fortier.*

Crops

A tribute to the importance of soybeans in the agriculture of the Midwest is found in an exceptionally well-written bulletin, No. 310, by J. C. Hackleman, O. H. Sears, and W. L. Burlison of the Illinois Agricultural Experiment Station. The discussion of this crop as a profit maker is quite complete, and in addition results of experimental work with different varieties on various soil types in Illinois are included in the bulletin.

America's most valuable and probably oldest farm crop is corn. Any new information on the crop therefore attracts attention. A very attractive special circular on "Corn Growing" has just been issued by the Wisconsin College of Agriculture. While its author, E. D. Holden, in this short circular, relates the crop to Wisconsin conditions, there are many helpful hints for growers in other sections of the country.

"Japanese Honeydrip Sorghum Silage versus June Corn Silage for Milk Production," Agr. Exp. Sta., Tucson, Ariz., Bul. 122, *Aug.* 1, 1927, *W. S. Cunningham and J. R. Reed.*

Monthly Bulletin of the Dept. of Agr., Sacramento, Cal., Vol. XVII, No. 5, *May*, 1928.

"Blueberry Culture in Florida," Agr. Exp. Sta., Gainesville, Fla., Bul. 194, *Feb.*, 1928, *Harold Mowry and A. F. Camp.*

"Experiments in Crossing Varieties as a Means of Improving Productiveness in Corn," Agr. Exp. Sta., Urbana, Ill., Bul. 306, *May*, 1928, *L. H. Smith and A. M. Brunson.*

"Bush Lima Beans as a Market Garden Crop," Agr. Exp. Sta., Urbana, Ill., Bul. 307, *May*, 1928, *J. W. Lloyd.*

"Experiments in the Culture and Forcing of Witloof Chicory," Agr. Exp. Sta., Urbana, Ill., Bul. 309, *May*, 1928, *C. B. Sayre.*

"Physiological Studies on the Nitrogen Fixing Bacteria of the Genus Rhizobium," Agr. Exp. Sta., Ames, Iowa, Research Bul. 113, *Rudger H. Walker.*

"Sweet Corn Seed Studies," Agr. Exp. Sta., Ames, Iowa, Bul. 250, *June*, 1928, *A. T. Erwin and E. S. Haber.*

"Sugar Cane Test Field Work," Agr. Exp. Sta., La. Bul. 202, Apr., 1928, C. B. Gouaux.

"Abstracts of Papers Not Included in Bulletins, Finances, Meteorology, Index," Agr. Exp. Sta., Orono, Me., Bul. 342, Dec., 1927.

"Bud and Root Selection in the Apple," Agr. Exp. Sta., Orono, Me., Bul. 344, Apr., 1928, Karl Sax.

Quarterly Bulletin, Agr. Exp. Sta., East Lansing, Mich., Vol. X, No. 4, May, 1928.

"Experiment Station Progress—Report for the Biennium, July 1, 1925 to June 30, 1927," Agr. Exp. Sta., Fargo, N. D., Bul. 217, Mch., 1928, P. F. Trowbridge.

"About Roses," Agr. Ext. Service, Columbus, Ohio, Bul. 71, Alfred C. Hottes.

"Varieties of Cotton for Oklahoma," Agr. Exp. Sta., Stillwater, Okla., Bul. 175, Apr., 1928, L. L. Ligon.

"Comparison of Cane and Kafir Silage for Milk Production," Agr. Exp. Sta., Stillwater, Okla., Bul. 177, June, 1928, R. B. Becker and Willis D. Gallup.

"Abstracts of Bulletins 347-365 and Circulars 43-47," Agr. Exp. Sta., College Station, Tex., Cir. 49, Jan., 1928, A. D. Jackson.

"Seed Production from Sugar Beets Over-Wintered in the Field," U. S. D. A., Washington, D. C., Cir. 20, Jan., 1928, John C. Overpeck.

"Weeds," Agr. Exp. Sta., Logan, Utah, Cir. 71, May, 1928, William Peterson and D. C. Tingey.

Department of Agriculture Immigration of Virginia, Richmond, Va., Bul. 246 and 247, June, 1928.

"Distribution of Wheat Varieties in Washington," Agr. Exp. Sta., Pullman, Wash., Bul. 224, Apr., 1928, E. G. Schafer and E. F. Gaines.

American Potato Journal, The Potato Assn. of America, East Lansing, Mich., Vol. V, No. 6, June, 1928.

Economics

The depression in the cattle business which followed the war has caused violent changes. A study of ranch organization in Eastern Colorado, Bul. 327 by R. T. Burdick of the Colorado Agricultural Experiment Station, reports a study of ranch organization and management. The data is from the records of 22 ranches in eastern Colorado. The average amount of land per ranch was 19,071 acres. Receipts from cattle were the chief source of income. Feed, leases, taxes, and labor were the largest items of expense. On some ranches taxes required one-fourth of the cash income. For the four years, 1922 to 1925, the average return on the investment for the ranches studied was 2.39 per cent. This bulletin gives an interesting insight into ranching as it is carried on in the West today.

In order to find out what changes farmers have made in their farming and marketing practices during the period of relative decline in hay prices since the advent of the automobile, the truck, the tractor, and the electric motor, a study was made in Pennsylvania in the market hay areas by F. P. Weaver, Head of the Department of Economics, Pennsylvania State College, and R. S. Washburn of the U. S. D. A., Bureau of Economics. Their findings, as published in Pennsylvania State College Bul. 223, show that in some sections commercial dairying has become more prominent. Hay sales in this region have decreased because of more intensive feeding of the cows during the winter period. The expansion of the poultry enterprise in some sections affords an outlet for effort, formerly devoted to hay. In some sections more cash crops, such as potatoes, cabbage, and other vegetables are grown.

There has been a rapid increase in farmers' cooperative marketing organizations. In order for these organizations to function to the best advantage, it is necessary for members to understand their responsibility. W. W. Fetrow of the Oklahoma Experiment Station has discussed this responsibility in a very interesting, new Oklahoma bulletin, No. 174.

"An Economic Study of Tomato Production for Canning in Arkansas," Agr. Exp. Sta., Fayetteville, Ark., Bul. 225, June, 1928, Carlos E. Campbell.

"Rural Social Organization of Clark County," Agr. Exp. Sta., Pullman, Wash., Bul. 225, Apr., 1928, E. A. Taylor and F. R. Yoder.

Diseases

"Cotton Wilt Studies: 1. Relation of Soil Temperature to the Development of Cotton Wilt," Agr. Exp. Sta., Fayetteville, Ark., Bul. 226, V. H. Young.

"Smuts of Colorado Grains," Agr. Exp. Sta., Fort Collins, Colo., Bul. 334, Feb., 1928, L. W. Durrell.

"Grape Disease Control in Delaware," Agr. Exp. Sta., Newark, Del., Bul. 154, Feb., 1928, T. F. Manns.

"Diseases of Lettuce, Romaine, Escarole, and Endive," Agr. Exp. Sta., Gainesville, Fla., Bul. 195, Apr., 1928, G. F. Weber.

"Infection Studies with Watermelon Wilt Caused by Fusarium niveum EFS," Agr. Exp. Sta., Ames, Iowa, Research Bul. 112, D. R. Porter.

Insects

"The Potato Flea Beetle," Agr. Exp. Sta., Fort Collins, Colo., Bul. 337, Mch., 1928, John L. Hoerner and C. P. Gillette.

"Wireworms Affecting Maine Agriculture," Agr. Exp. Sta., Orono, Me., Bul. 343, Feb., 1928, J. H. Hawkins.

"The Chain-Dotted Measuring Worm, A Blueberry Pest," Agr. Exp. Sta., Orono, Me., Bul. 345, May, 1928, C. R. Phipps.

"The Beet Leafhopper in Utah," Agr. Exp. Sta., Logan, Utah, Bul. 205, June, 1928, George F. Knowlton.

"Treehopper 'Injury in Utah Orchards, Agr. Exp. Sta., Logan, Utah, Bul. 206, June, 1928, Charles J. Sorenson.

"Spray Information for Virginia Fruit Growers," Ext. Div., Va. A. & M. College, Blacksburg, Va., Bul. 102, Jan., 1928, F. A. Motz, F. J. Schneiderhan, and W. S. Hough.

"The Sugar-Cane Moth Borer in the United States," U. S. D. A., Washington, D. C., Tech. Bul. 41, Mch., 1928, T. E. Holloway, W. E. Haley, U. C. Loftin, and Carl Heinrich.

Pineapples

(*From Page* 44)

vigorous will produce fruit in about 18 months. Slips from the crown of the fruit may also be planted, but being smaller require a longer period to develop fruit.

The fruit of the pineapple may possess any one or more of the variations of taste from delicious and luscious to pungent acid and almost putrid. Various conditions contribute to this variation in taste; however the controlling factors are fertilization of the plant and the proper stage of maturity at which the fruit should be picked.

A recent publication of the Porto Rico Agricultural Experiment Station on Fruit Maturity of the Pineapple, by Henry C. Henricksen, Director of Farm Management, gives very valuable and interesting results of investigations on this subject. Comparisons of fruit picked at the different stages of ripeness show that the standard of maturity is the plant-ripened fruit, that is, the fruit which has been left on the plant until it is fully colored and picked before it has begun to deteriorate. At this stage the fruit is at the height of perfection for immediate consumption, but it is not suitable for long distance shipment because the tissue is too soft to withstand the weight of the surrounding fruit when packed several in a crate and it cannot be kept very long, except at a low temperature.

The problem, therefore, is to pick the fruit at the ripest stage of maturity at which it can be shipped. This condition will be influenced to a great extent by the quality of the fruit. Plants liberally fertilized with properly balanced plant foods make fruits which can be picked at a fairly advanced stage of maturity and yet stand up well in transit, being conserved by the acids developed in the fruit tissues by the action of the added nutrients during growth.

Leaves Make Sugar

Studies and investigations of the ripening processes of pineapples have disclosed the fact that the sugar content of the fruit is derived exclusively from the leaves of the plant, as the fruit approaches maturity, and does not increase after the fruit is removed from the plant. If the fruit is picked green and allowed to ripen, the sugar content at complete maturity is the same as it was when the fruit was picked. Analyses of the fruit show that it contains no substance that can be changed into sugar during transit

or in storage; therefore fruit that is picked too green is always lacking in flavor. The sugar content of such fruit is from 2 to 3 per cent, while that of the fruit ripened naturally on the plant ranges from 9 to 15 per cent. The sugar content may increase as much as 5 per cent in two weeks during the process of ripening. The so-called ripening of green fruit after cutting from the plant appears to consist largely of a softening of the tissues.

A microscopic examination of sections cut from the green fruit shows that the tissues are greatly thickened, but become extremely thin on ripening normally. The pungent sensation on the tongue experienced after eating pineapples is due largely to needle-shaped crystals of microscopic size that are imbedded in the pulp. These crystals are present in mature and immature fruit alike but are more noticeable in the latter as the tissue is more difficult to masticate, and the more thorough mastication produces a more intense sensation.

The main points thus brought out are, that the pineapple fruit contains no starch or other sugar-producing material that can be converted into sugar during the ripening process after separation from the plant. It derives its sweetness solely from the stored-up carbohydrate materials in the tissues of the leaves and stock, and when once picked it is finally cut off from its base of supplies.

The weights of the Red Spanish variety, vary from 1lb. 6 oz. to 6 lbs. 3 oz. The crate used for packing is a size universally adapted for the market and holds and takes, according to size of fruit, from 12 to 48 fruits. The 48 size is not shipped to the northern markets, and for the past two years very few if any of the 42's have been shipped. The consumer, armed with the knowledge of the size and weights of the fruits, knows what he may expect for his money when he buys pineapples by the box or the piece. For instance, a pineapple crate will hold 24 fruits weighing 3 lbs. 2 oz. each, a total net weight of 75 lbs., while the same size container will hold 36 fruits weighing 2 lbs. each, or 72 lbs. net, a difference of 3 lbs. in favor of the larger size. Normally the larger fruit should contain a comparatively larger

Fertilizing pineapples—Bainoa, Habana, Cuba.

	Yield crates per acre	Value of fruit per acre	Cost of fertilizer per acre	Net returns	Returns for $1.00 invested in POTASH
(1) no treatment	182	$ 547.50	———	$6	———
(2) 5-10-0	234	$ 725.50	$31.20	$ 694.30	———
(3) 5-10-10	324	$1,104.00	$41.13	$1,062.87	$38.12

per cent of juice and a better flavor.

The pineapple must have a generous supply of air at the roots in order to thrive well; therefore a light soil is best adapted. A very fine sandy soil is not desirable as it packs too closely and excludes the air from the roots. The same objection applies to a heavy clay soil. A clay soil containing a fair portion of sand or humus or both is considered good. Different types of this soil naturally produce different effects on the yield and quality of the pine.

For a number of years pineapples have been grown on some of the red soils of Cuba without fertilizer, but practical and scientific experiments have demonstrated that a properly balanced fertilizer greatly increases the yield and quality of the fruit. It is also safe to say that the fertilized fields, owing to their greater vitality, can be carried two years longer without replanting than those unfertilized.

Various formulas are used, such as 5-9-13, 5-10-10, and 6-10-13. From 1,500 to 4,000 lbs. per acre are applied, according to the class of soil and the number of plants. Depending on the system of planting, an acre may contain from 6,000 to 14,000 plants.

An experiment conducted at Finca "El Desquite," Bainoa, Cuba, of Sr. Andres Arguelles, gave the above listed results per acre of 6,800 plants.

The average price received per crate of pineapples in the check plat was $3.00, for plat 2 (5-10-0) was $3.10, and for plat 3 (5-10-10) was $3.40. The average difference in price per crate was due entirely to the size and quality of the fruit.

The experiment demonstrates the value of fertilizing. Potash, the controlling factor, plays an important role and proves to be a good investment for the grower since an expenditure of $1.00 gave a return of $38.12.

In conclusion, it is the writer's observation that when ripened, the pineapple is not only a delicious fruit, but that with good cultivation, scientific fertilization, care in handling, packing and shipping, the industry is a good business.

Utah Knows Her Onions

(*From Page* 17)

The weeds are kept out until harvest time which starts when the seed pods begin to change color and break. The pods are sun dried in canvas bottomed 4 x 12 crates until the greater part of the moisture is removed, after which they are hung up in white sugar beet sacks until they get dry enough to be threshed. Threshing is done by beating the pods in coarse canvas sacks. The rough stuff is then removed and the threshed, immature kernels are separated from the plump, healthy ones by putting the seeds in water. Those that do not sink within 10 minutes are considered to be unfit for planting.

Winegar said this process does not hurt the seeds as they are immediately spread out to dry in the sun. They

are then certified and sent all over the United States at a customary price of $10 a pound. This may seem to be a high price in view of the fact that yields of 400 pounds to the acre are secured, but the cost of producing the crop is high. It takes only about three pounds of onion seed to plant an acre, so the extra cost above common seed at five to eight dollars a pound is not great when one remembers that some of the gardeners who made this saving of a few dollars on seed in 1926 left their onions in the ground as they did not grade high enough to market them. On the other hand, Bountiful onions from home-grown seed have been so good that a special grade called Utah Fancy had to be established on the trade. This grade is anything three inches in diameter or over while U. S. No. 1 Large is from 2¼ to 3 inches in size.

A Hoosier Corn King

(*From Page* 30)

gathering, drying, and selecting his corn without fearing that it may not sell and his time will have been wasted. However, application for seed certification in 1925 resulted in the stamp of approval by the Indiana Corn Growers Association, and Moffitt's name was added to the list of certified seed growers. This step increased the sales of his seed corn, and gave him encouragement in this new undertaking. Since that year Mr. Moffitt has been a regular applicant for seed certification, and his seed house has been entirely emptied annually long before planting season.

Since launching his seed corn business Mr. Moffit has consistently showed corn at the local, state, and International shows. In 1926 his 10-ear sample of Reid's Yellow Dent placed third in its section, and in 1927 his exhibit was among the best. Finally in 1928 came the honor that every Hoosier corn man craves—the distinction of winning the Indiana Corn Show in the warmest kind of competition. And so the name of Moffitt has been added to the growing list of Indiana corn luminaries, and as rapid a rise to fame as has ever occurred in Hoosier Corn-land is here recorded.

Pages From A Field Note Book

A picnic dinner was served cafeteria style—Mathews' Alfalfa Field Day.

Alfalfa Responds to Potash Top-dressing

By I. J. Mathews
Winamac, Indiana

ALFALFA in its growth uses four times as much potash as phosphorus—according to the latest edition of Henry & Morrison's Feeds and Feeding, the bible of the livestock world. Last fall I chanced upon this information and it interested me very much, for as countless other growers have been and are doing, I had always fertilized my alfalfa largely with phosphoric acid. I did slip once and used an 0-20-20, and much to my surprise on this poor old field had the best alfalfa I had ever seen.

Although I was born in Michigan, have worked in Illinois, and now live in Indiana, mentally I am always from Missouri. When I can't be shown by others, I try to show myself. And so, when I found the statement from the authorities mentioned, I set about trying to see what more potash would do for alfalfa.

On the 20th of last October I staked off a portion of an alfalfa field that had never done much except on the first cutting, and sowed by hand 200 pounds of muriate of potash per acre. Certainly that should be enough to demonstrate something—or nothing.

That treated part seemed to make a little better growth last fall, and this spring my attention was called to it again because the last frost in the spring nipped this harder than any

Short growth and signs of potash starvation were found where no potash had been applied.

other part of the field—there was more alfalfa to nip. Two or three days later it was conspicuous because of the whitened tops.

On the 15th of June, when we held our annual field day, the parts of the field that had received no potash were showing a great many plants with signs of potash starvation—light spots on the leaves. The alfalfa which received the 200 pounds of muriate of potash last fall showed none of these spots on the leaves and was about eight inches taller.

It had occurred to me when the potash-starvation symptoms began to appear, to stake off some of the plants which showed the most signs and water them with some water in which potash had been dissolved. We watered the plants on a spot about four feet on the 5th of June, and on the 15th of June that spot looked like an oasis of dark green in a background of mottled yellow and brown. The green had come back into the leaves and many of the white spots had disappeared.

Two hundred pounds of potash per acre made this difference in growth and healthy plants.

What I Did With Waste Land

(*From Page 28*)

land. The corn produced 25 bushels per acre, market here $1.00 per bushel, $25.00; potatoes 85 bushels per acre, present local price $1.15 per bushel, $97.75; adding the returns or value of the corn produced on one acre to the value of the potatoes from one acre, we have $122.75, an average income per acre of $61.37.

The only cash outlay was $4.80 per acre for fertilizer. Allowing customary wages for work done, clearing, and cultivation, the total cost per acre was $24.80; $61.37 minus $24.80 leaves $36.57 profit.

To thorough cultivation combined with the use of good fertilizer is due the credit.

Why a farmer will think it so necessary to feed himself, family, horses, cows, pigs, and poultry, and provide shelter from winter rain and cold, and fail to recognize the necessity of feeding his crops and soil and protecting the latter with a carpet of green to prevent it from washing and leaching, remains a mystery. The prosperity and welfare of himself, family, and livestock depend entirely on the yield of his crop and the continued fertility of his soil.

You cannot cash a check without funds in the bank; you cannot get a yield of crops with no plant food in the ground—the conditions are the same. Why produce crops at a loss? Why make your land poorer each year?

Feed your crops liberally with a high grade fertilizer suited to its needs; grow cover crops to make humus. The more humus in your ground, the more fertilizer you can use profitably; the more fertilizer, the larger the yield and the larger your bank account. Reclaim the waste land and make it an asset instead of a liability. It will pay its own expense. Try it and see.

Stacking Beans

(*From Page 27*)

as to form a pad about four feet in diameter and five inches thick when settled down.

The beans from the four windrows are collected with a pitchfork and piled around the post. The bottom formed by the beans should not be over 3½ feet in diameter. The stack is built straight up for about two feet and then is drawn in a little until it is capped well above the post.

The beans can remain in the stacks until a good day in fall when it is convenient to thresh them. If it seems that the weather will be bad, it is best to pull and stack the beans the same day.

An average person should be able to work three to five acres per day, the number depending on the cleanliness of the fields. The average cost of posts is about $3.70 per acre. Winds have a better chance of drying the beans in stacks. Even in case of a shower a light breeze will be able to dry the beans sufficiently to be threshed.

HIGH POTATO YIELDS

"There is no compromise in potato growing if you want the big yields; you can't get by with inferior seed; there is no substitute for plant food; you can't make any concession to insects and diseases; there is no neutral ground with weeds. There is no compromise—no middle course—if you want the best in potato yields and quality."

In just those words, Dr. E. L. Nixon, extension professor of plant pathology, Pennsylvania State College, gives the secret of success of the 400 bushel potato growers in his state, and, we might add, of the high-yield potato growers of other states as well. This "uncompromising" attitude toward the enemies of good potato crops is largely responsible for the large number of growers who, in 1927, made potato history with yields, of 300, 400, 500, 600, and even 650 bushels on measured acres.—*L. H. Woodward, County Agent, Warsaw, N. Y.*

BUILD LIME HOUSE

There recently has been completed at Maryville, Mo., a lime storage house for the benefit of those farmers who are unable to handle a carload of ground limestone at one time. At the suggestion of Walter B. Remley, Agricultural Agent for the C. B. & Q. R. R. Co., County Agent J. Ross Fleetwood secured the loan of $300 from the local banks with which to erect the building on the railroad property and finance a couple of carloads of lime. The building cost $200. A profit of 10c per ton is made to retire the $300.00 loan.

It is hoped that by making the ground limestone so easily accessible, there will be a decided increase in its use in this community. Farmers who bring a load of produce to town can take back a load of lime thus cutting down their hauling charges. Under the old system when a carload arrived and the weather made the roads bad so as to delay unloading, there were demurrage charges to pay. Many farmers who needed and wanted lime could not handle a carload, so that the use of lime was considerably reduced.

This project is an excellent example of an attitude of helpful cooperation between the railroads and the territory they serve.—*D. A. Caldwell, Maryville, Mo.*

FORECASTS BEAT THE SUGAR BEET HOPPER

Walter Carter of the Federal experiment station at Twin Falls, Idaho, and now doing work for a doctor's degree at the University of Minnesota, has developed a forecasting service for sugar beet growers which in two seasons saved the Twin Falls area millions of dollars. In this region the sugar beet hopper, or white fly, lives through the winter and breeds in the deserts of southern Idaho and when the wild plants dry up it migrates to cultivated crops. By making a study of this desert region and the habits of the insect he found that when severe winter weather had killed off a great proportion of the hopper population he could safely predict the following year would be a good one to grow sugar beets. Conversely, he found he could forecast with considerable accuracy that a favorable season on the desert plants meant disaster to anyone attempting to grow sugar beets in that region that year.

The sugar beet hopper doesn't do the damage itself but carries a disease which causes the plant to turn yellow and curl up. A disease resistant beet is the real hope for beet growers in regions infested by the hopper. But in the Twin Falls section they seem to have found a means of growing beets successfully a part of the time.

The Corncob

(*From Page 6*)

stances, in laboratory experiments and also commercially, have been transformed into a host of useful things. Pentosans are five-carbon sugars. That is to say, they are sugars lacking the specific quality, namely sweetness, by which the laymen usually recognizes sugar. Sugar like sucrose, dextrose, and levulose are six-carbon products. When you break down a six-carbon sugar you get an acid. When you break down a five-carbon sugar, that is to say a pentosan, you get an "aldehyde"—for example, furfural.

From furfural industrial chemists produce artificial resins used in making printing plates, phonograph records, varnishes, pipe stems, cigarette holders, electrical instrument parts similar to those made with hard rubber, backs for brushes, and many other useful and valuable articles. This is possible because furfural is not unlike formaldehyde. It has been known for about 20 years that formaldehyde mixed with phenol or carbolic acid will produce synthetic resins. Such resins today are familiar to every smoker in the form of bakelite and redmanol in cigarette holders and pipe stems. When the Government chemists discovered that the same thing can be done with furfural, agricultural prospects, with the far-sighted, went up a few points. Furfural is also a possible source of motor fuel, although because of its high boiling point it can not be used with the type of carburetor suited to gasoline.

About eight years ago the Bureau of Chemistry found out how to get furfural out of corncobs at small cost. They were led to this discovery by a belief that furfural obtained from pentosans in farm wastes might be valuable as a dye intermediate. Accordingly they looked around for a handy and abundant supply of pentosans, finally choosing the corncob as the best source because of its convenience in handling and the ease with which it can be assembled in large quantities. They found that pentosans from corncobs decompose into furfural when heated with water and acid, or with water alone under pressure. Furfural can also be obtained in the same way from oat hulls, peanut hulls, and other farm wastes.

Many Uses for Furfural

This was a discovery of capital importance. Previously furfural had been so expensive that it was little more than a chemical curiosity. By the new process, a way was opened for its production cheaply and in large quantities. Worth $30 a pound before the discovery of the new method, furfural is now commercially produced in a quantity exceeding 500,000 pounds a year and sold at from 10 to 17½ cents a pound. At this price it becomes a competitor for formaldehyde in the production of synthetic resins, and has numerous other industrial possibilities. Several new plants for the commercial elaboration of furfural from farm wastes are under consideration.

As yet the cost restricts the use of furfural resins to the manufacture of electrical, radio, telephone and similar equipment. But this drawback is likely to be only temporary. Improved processes have raised the yield of furfural to about 200 pounds per ton of corncobs, or half the theoretical maximum, and the cost of the operation has been reduced. Furfural from corncobs will eventually be com-

mercially utilized in a thousand ways as yet scarcely imagined.

As for the third main constituent of corncobs — cellulose — laboratory experiments have demonstrated several means of utilizing it. Cellulose from the corncob may be nitrated and made into spools, picture frames, combs, etc. Many other things commonly made of wood, such as wall board and other building materials, can be produced from it. The possibilities of corncob cellulose as a substitute for wood in pulp and paper making are considerable, although cellulose from other sources is cheaper at present.

Incidentally the industrial use of corncob cellulose may yield valuable by-products, a possibility already demonstrated with straw. A commercial plant in Minnesota produces illuminating gas and motor fuel from straw by a process which yields tar and carbon. From the tar and carbon the company makes paint and auto-top dressing, roofing materials, and disinfectants. As yet it has not been found possible to use all the gas produced. Some of it is utilized, after the manufacturing process starts, in heating the retort into which the straw is fed, but the greater part is wasted. Nevertheless, the existence of important possibilities has been established.

Uses of Cottonseed

Anybody with a grain of faith in science, or with the least knowledge of what science has already done in utilizing farm wastes, will not doubt that, before very long, the part of the corn plant out of which we now get practically nothing will be valuable. Consider, for example, what has been done with the by-products of the cotton plant. Cottonseed, for example, contains four primary elements —crude oil, cake, or meal, linters, and hulls. Chemistry has already found immense markets for the first three of these by-products, and has glimpses of a market for the fourth. Cottonseed hulls may not long remain in the category of farm wastes because, as already observed, they resemble corncobs in containing furfural, acetic acid, alcohol, tar, and other hydrocarbons.

Until about 75 years ago cottonseed was wholly wasted. Then a chemist found that cottonseed oil is edible, and within a decade more than a million tons of cottonseed was being diverted annually from the refuse heaps to the oil mills. Improved methods were invented to separate the "meat" of the seed from the hull, so that loss of oil in the crushing process was greatly reduced. Decorticating machines were devised which extracted a very high percentage of the oil, and improved the oil cake by freeing it from adherent fiber and hulls. Oil cake thus prepared came widely into demand, not only as a concentrated feed for cattle, but also, because of its high nitrogen content, as fertilizer. A still better separation of the hulls and the meats was eventually obtained by delinting the seed before crushing it. Crushing seed with the lint still on it causes a considerable amount of the contents to become tangled in the fuzzy hulls. Modern delinting machines which prevent this loss effect huge savings.

This saving is two-fold in character. Delinting machines, besides getting more oil and oil-cake from cottonseed, furnish a by-product, linters, for which the chemist has found a hundred uses. Employed only as batting or mattress filling 20 or 30 years ago, linters today are made into felting, upholstery, padding, rope, fleece lining for underwear, explosives, surgical dressings, artificial leather, sausage casings, roofings and floor coverings, wearing apparel, photographic films, toilet articles, pyroxlin paints, and billiard balls.

Here is evidence enough that searching for buried treasure in the

corncob is not a wild-goose chase. Economic as well as chemical problems must be solved before what is in the corncob will be worth actual money. But economic problems usually present fewer difficulties than chemical problems. Uncovering wealth when it has been located is generally easier than locating it—a fact which suggests by the way, that the services of the prospecting chemist are not rewarded as generously as they should be. That, however, is another story. We are simply concerned with the problem of the utilization of farm by-products, the solution of which will free the farmer from much unrequited toil.

If you want to know how long it will be before the farmer can expect to cash in on what the Government chemists are doing for him, the answer of course is that nobody knows. But we might get a line on the prospects by watching the outcome of a recent success in the Bureau of Chemistry. This is the discovery of a new way to obtain gluconic acid. This compound, formerly very rare, is now produced in good yields through the action of certain molds on corn sugar or dextrose. It is expected to result in a materially increased industrial utilization of corn. Watch the outcome, and you will have some kind of a measuring rod by which to judge other phases of the reclamation of farm wastes.

The Quality Era

(*From Page* 24)

tal law of economics necessitates that products must be worth the price asked for them or they cannot survive on a buyers' narket.

A veteran agricultural authority in one of our midwestern states thus drew on his experience of half a century with American farmers by summing up the situation about like this: "I've seen a constant improvement in the efficiency and per capita production of our farmers, but their past accomplishments will be insignificant when compared with what the future has in store for them."

Complete fertilizers insure yield and quality.

More and more our farmers are learning that what they get for what they raise depends to a great extent on what they spend to produce it. They are rapidly coming to realize that the value of their dollar in purchasing raw materials and equipment for production is proportionate to the amount of judgment they apply with it. Price today has almost universally ceased to be the only basis of comparison in buying. Both our urban and rural people have learned to appreciate quality.

Oklahoma

(*From Page* 10)

els on the unmanured. Barnyard manure is applied to the manured plot once in four years at the rate of about 10 tons per acre.

A regular series of fertility test plots have been established on the station farm, with rotation tests emphasized. The top-dressing of alfalfa with commercial fertilizer materials and with manure is another series of tests. Other plots have been started at a number of points over the state to furnish comparisons and to give results on the different types of soils under varying climatic conditions.

Most of the outfield experiment station plots are located in the eastern part of the State as the United States Department of Agriculture is working in the western part of the state where conditions are dry. A station is maintained at the Panhandle Agricultural College, Goodwell, Oklahoma, under the direction of H. H. Finnell.

This Panhandle Station has 700 acres of land at its disposal. Eighty acres are used for plot and field experiments; four acres for orchard; 160 acres for livestock farm rotation; 30 acres for farm lots and buildings; and 426 acres for native pasture. Moisture problems are receiving a great deal of attention at this station. The effect of terracing on dry land farming is part of this study and is giving some significant results indicating that terraces to insure that no rainfall is lost by run-off may be a very profitable practice. Another promising line of work is in breeding sorghum strains to meet the semi-arid conditions with increased yield and easier handling.

Record Potato Yields

(*From Page* 19)

comeback. What are the reasons for the recovery—why are larger yields now being obtained on land that has been farmed many years, than were gotten on the virgin soils when they were first reclaimed?

That such yields were gotten in three years out of four shows that they were not the result of any freak of climate, season, or other element of chance. It was not a question of the variety used, for it was the Burbank which made the first record, Wisconsin Pride the second, and British Queen the third. Furthermore, these yields were not secured from "pet" acres, grown especially for high yield regardless of cost, for they were in each case selected from large fields grown as a commercial crop.

No doubt one of the important factors has been the use of plenty of commercial fertilizers. As much as a ton per acre of an 0-21-24 fertilizer has been used, and this is equal to 4,000 pounds of 0-12-12, which formula is a favorite on peat and muck in many sections of the country. Of course little is really known about the fertilizer requirements of these "soils" beyond the fact that they do respond to ample applications of potash and phosphoric acid. But some growers in the California Delta are progressive and are continually making experiments in an effort to ascertain the facts that will lead to still higher and more economical production. Thus, in 1924 Mr. Rindge had more than 100 fer-

tilizer test plots, and as Herbert Zuckerman says, when we really get at the fundamentals involved, much greater things will be possible.

Another consideration is the amount of seed used. Planting is in rows 28 inches apart—just wide enough for horse-cultivation, with the seed dropped 9 to 12 inches apart in the row. Using seed pieces about 1¼ ounces in weight means that about 22 sacks or 44 bushels of seed are required for each acre. This is very heavy seeding, but it has proven profitable when growth conditions are favorable. There are no fungous diseases to combat except Rhizoctonia; the water is supplied by sub-irrigation in liberal amount through the growing season; the light, loose muck is cool and well aerated, providing good environment for the tubers to develop; and the growing season is long. With all these factors so well taken care of, liberal fertilization and heavy seeding leads to heavy yields. The chief factor that has not yet received the attention it deserves is seed selection. Use of vigorous disease-free seed stock will lead to even better results in the future.

Tomorrow's Farmer

(*From Page* 18)

At the present time, however, only a few agricultural corporations have been able to operate at a profit. There are a great many large farms or "estates" scattered in different parts of the nation which are owned by men who have made their money in other fields and are now gentlemen farmers. Mostly these establishments are a hobby in which profits are subordinated to considerations other than utility.

It is very seldom that a manager may be found who can make such farms pay. There are others, however, which are operated by corporations and where the proposition of "putting on a front" does not enter. The number of such establishments is increasing and more of them are making some money for their stockholders.

It is possible also that a cooperative system, in which individuals or corporations share the work and the proceeds with the tenants, may soon be more extensively developed. One of the best examples of this is the Sinissippi Farms, owned and operated by Ex-governor Lowden, of Illinois, leader of the militant agricultural political forces of the country. One or two large projects are also operated on a similar system in my own neighborhood. The landlord or owner supplies the land and sometimes the livestock and machinery. There are many different types of leases of this kind, but all of them require that the tenant furnish the labor and an agreed-upon percentage of operating costs. In such cases the landlords are in a position to be of great help to the tenants by being able to supply seed and merchandise at wholesale prices.

I am inclined to think that this system headed by both wealthy individuals and stock corporations holds great promise in the future and will probably develop to as great an extent if not greater, than that of large corporations operating farms by hiring all their own labor.

In spite of the development of these agricultural enterprises I am not very much concerned over the fear that small owner-operated farms of this country will be done away with.

American farmers are extremely independent and most of them would rather farm and "be their own boss" than to be on the payroll of large corporations.

The type of man who will fit best into the super-farming operations is probably the man from the city who wants to get away from the hurly-burly of Metropolitan life to a quieter, and if you please, saner existence in our rapidly disappearing "wide open spaces."

At the rate which our cities are growing and our industries developing, it stands to reason that they will continue to overlap the country at an increasing pace.

This will make it hard to determine just where the country ends and the city begins. It means that in the immediate neighborhood of large towns there will be a great increase of small farms devoted mostly to market gardening.

Some industrial leaders believe it possible to develop a system whereby factories concentrate on production in the winter months and release at least part of their labor in the summer to the farms. The owner of a small farm can develop a nice home and make a little money off his land and at the same time increase his income by working in the factories. Just to what extent such development actually will occur is hard to say. It is quite probable that there will be at least a partial development of this system in some industries and in certain localities.

The farmer of the past has been highly individualistic and even today he has not lost all of his clannishness. In fact, at the present time the farmer is a more powerful political unit than at any time in the past. It stands to reason that if there is no radical change in the farming methods or improvement in the financial condition of the rank and file of the farmers that this political cohesion will be intensified in the future. When all the farmers are making money, they are not going to be worried about who is going to be the next president or whether or not congress will pass relief measures.

Irrespective of what happens to agriculture along mechanical and organization lines, the social condition of the future farmer will be vitally different from that of the past. With radios having almost complete possession of the farm, with nearly every farm family having one or more cars which connect their home with the nearest city by means of quick and easy journeys over improved roads, the farmer cannot help but come to think and act in terms of the city.

Little Church to Go

It is very probable that in a great many rural localities the little church in the vale will disappear entirely and religious services will center exclusively in the villages and cities. The red school house on the hill has already disappeared almost entirely, and consolidation is becoming more and more an assured fact. It will be a matter of only a few years before there will be no such thing as a "country school" in many sections of the nation. Busses will pick up the children and take them to centralized schools in the villages and nearby towns. The high schools of most large cities have already been compelled to charge tuition fees for non-resident pupils in order that the country children will not crowd out those children entitled to first privileges of the school.

There is no question but that along religious, educational, social, mechanical, and organization lines that the farming of the future, and of the very near future, will be vitally different from that of even the past 10 years. The country boy and girl will be going to a different kind of school and will have a vastly broader outlook. This nation will be a melting pot not only of race but of rural and urban life.

Protect Your Wheat

(*From Page* 14)

the Ohio agricultural experiment station. In a five-year rotation, the average yield of wheat for 28 years with a complete fertilizer was 26.75 bushels per acre; without fertilizer, 10.15 bushels per acre. No fertilizer was applied to the clover. It was all applied on the crops preceding. The yield of clover hay was increased 1,814 pounds per acre. This emphasizes the possibility of the proper use of fertilizers in this territory.

Large areas of winter wheat land in the Midwest are lacking in available phosphorus. This is often the first fertilizer needed. Many farmers are using superphosphate with good profit.

But is superphosphate enough? The increased crop of wheat grown by adding superphosphate removes from the soil greater quantities of nitrogen and potash. Thus, with the continued use of fertilizers high in phosphoric acid, the supply of available nitrogen and potash tends to become exhausted. Under average conditions, when the yields are increased by using superphosphate, not enough manure is returned to the soil to keep up the supply of either nitrogen or potash.

Taking out increasing quantities of the three elements, nitrogen, phosphoric acid, and potash, and returning only one, will eventually lead to loss. The superphosphate will become less and less effective. Lower yields and diseases of many crops will be the result. This is the general history of continued fertilization with one element only.

On many farms potash should be added to the superphosphate when used for growing wheat and clover hay, particularly if manure is available only in small quantities. That this is practical advice is proved by the fact that on most of the county experiment farms of Ohio, conducted by the agricultural experiment station, the profit from the rotation on corn, oats, wheat, and clover hay was increased when muriate of potash was used in addition to the superphosphate.

These results apply particularly to experiments on soils derived from limestone. This means that roughly, three-quarters of the farm land in Ohio and very large acreages in other states should receive a fertilizer containing phosphoric acid and potash, for the most profitable results on wheat and clover.

If clover or wheat yields are not satisfactory and a farmer is using only superphosphate or mixed fertilizers low in potash, he should look for signs of potash starvation on the clover leaves. They are as follows: On the leaves yellow to brown spots will be found which develop around the border of the leaf and usually form a more or less definite pattern. Later on, spots develop towards the center and the border becomes yellow, curls down, and dries up. The portion around the middle rib is the last to be affected. The spots always appear on the older leaves. Spots caused by insects should not be confused with these spots.

That clover does not grow as it used to is well known. Clover demands lime and inoculation, but it is also a "potash-hungry" crop. It removes a large quantity of potash from the soil. A good crop of mixed hay removes about 75 pounds of actual potash per acre, equal to 150 pounds of muriate of potash. The soil supplies some of this potash, the manure more, but on very few farms is there enough available potash used to produce the most profitable crop of clover hay.

And so with the spotlight turned on the farmer's wheat losses, and careful attention given to control them, the next step in large and quality production is proper fertilization.

Gardening

(*From Page* 4)

of yellow I have since attained is wild mustard, while I find I can best imitate the blue border with chicory.

When I have money enough to employ this gardener and subsidize a greenhouse I shall have this Dominion delight for my own backyard. Till then, *ad referendum*.

I cannot recommend absentee gardening, however, for it is like absentee landlordism—hard on the soil and tough on the soul. To envy your friend's onions is a greater sin than to grow them and have your own halitosis. The proper thing to do in that case is to be original and grow garlic. Imitation gardening is only a hindrance to pioneer spirits moving in a wilderness of weeds toward the hopeful harvest of a hill of beans.

Conventional gardens to my notion are no more comfortable than conventional clothes. Formal dress has its honest uses, however, and carries the advantage that one can change it at will for something easier. But a formal garden is torturing nature into harsh lines and angles, whereas we know that plain geometry and plant genetics have nothing in common. I have a friendly enemy who owns a small plot where he has trimmed the cedars in the shape of tables, pillars and pots. I shall suggest retrimming two of them this season to resemble a donkey and an elephant, and then get ready to cut one of them down after the November election.

As a rule when the large formal gardens on large estates are in their highest degree of starchiness and primness there is nobody left around the premises but the underlings. Do the owners of such places take their vacations to escape the graveyard feeling that such gardens give?

Our own middle class gardens appease the palate, appeal to the perceptions, promote physical culture, and protect the purse. My garden has done all this for me and kept me from falling a victim to the golf craze besides. I have never perfected a "stance." I prefer to do my sod chopping where it will be of some normal use. My leathery coat of tan and my wife's fresco of freckles have been acquired on our own fairways of bucolic content.

How many of us consider how much gardens are a part of human life and the fundamental development of race culture? The first man and woman lived in the Garden of Eden, and the greatest human sorrow was in the Garden of Gethsemane. Archaeologists who dig into the bowels of the earth's crust on the sites of ancient cities discover traces of garden ornaments, and the Indian historians of America show us plenty of evidence that the red brother cultivated the corn plant long before he was captivated by corn whiskey. I am quite sure that some of the Colonial patriots were prouder of having grown a prize pumpkin than having their sputtering signatures on the Declaration of Independence. Sage, pennyroyal, rosemary and mint, brave little roses and tendrils of English ivy—these were the compensations which our New England mothers enjoyed for having severed home ties to begin life anew in a savage-haunted realm across the sea.

They feed tomato juice and spinach to infants, dill pickles to debutantes, and extract of sauerkraut to vitalize our declining years. They bring flowers to the mothers of new-born babies, and the florist enjoys his reward with the undertaker. No human habitation assumes its right proportions or hides its visible defects without herbage and flora. The first thought in planning a better city is to put in parks, after they have the parking space! The first cost of any public building is not the only cost. There

must be land for a lawn and a janitor for the tulip beds. I am just a little perturbed right now over providing suitable gardens for the sky-high air ship depots and the mid-ocean landing places. However, give me time and I will Burbank it all right.

YET I have observed that horticulturists are among the most timid and reticent of mortals, despite their vantage places of universal envy and esteem. To mix up the metaphor a little, it is the desire of all good householders to have their own vine and fig tree blossom like a rose. Some of them are not too proud to seek advice. They want the earliest tomatoes and the climbingest roses, the most headstrong cabbage and the kinkiest kale that nature and their own skill can produce. They are anxious to have angleworms for bait but they don't want grub worms in their sod. They write to the horticulturist to learn what to concoct that will deal sudden and permanent extinction to those "hump-backed bugs that cause warts on cucumbers." The more adventurous of them seek a way to graft a tomato bud on a potato root stalk so as to get Chili sauce above and French fries below. 'Tis true that horticulturists are entitled to a meed of praise for patience in being the father confessors to so many vegetable homicides; but I repeat that their fault is professional modesty. No, I am not forgetting the nursery catalogs, but they pass through the hands of journalists 'ere they reach us with their militant optimism.

American college horticulturists are particularly prone to be that way. Those in Canada seem to have more gumption. In America the livestock feeders and the students of field crops have pushed the horticulturists off the map, with a few exceptions. Our horticulturists have plenty of stamp money to use when they answer those nosey letters from amateurs like myself. But they don't seem to have got past the stamp act in their legislative appropriations. Figuratively, the fences are down at our experiment stations and the cows and chickens are wandering at will over land that ought to be in horticultural research. As a consequence, we have more pork than apple sauce and more corned beef than cabbage. But knowing these gentle horticulturists as I do, I would never insist that they abandon orchard grafting for the other kind.

But after all, I presume that gardening is a lot like life. Nobody can tell you what to do or when to do it under the peculiar environment in which the garden or your life moves on its way. You have to grope around and operate your own experiment station, with the help of information in general that certain things retard and other things promote normalcy and growth.

NORTHERN gardening on old soils amid the breeding grounds of all the insects known to the state entomologist is a great thing to promote stamina as well as sunburn. Despite lice on my turnips and slugs on my tomatoes, despite our long winters and short asparagus, I tell you I would not trade my honest hours with the hoe for all the largesse of the tropics.

The closest I have been to the tropics myself is when I found a spider in a bunch of bananas, but the facts I present are those of another equally capable observer who is no more afraid of the truth than I am.

He told me of the flowers in Java, mostly Cannas, Gardenias and members of the family of Convolvulaceae. He said they were bold and flashy like some overdressed dowager, but highly unsatisfactory from the aesthetic point of view; there is nothing personal or affectionate about them. They are fat and luscious, and either smell too much or not at all. He saw an enormous Rafflesia in Sumatra, a purple cup like a gigantic crocus, rising from the decaying trunk of a tree. At a distance it was wierdly beautiful

like some Arabian Night drapery, but on examination he found the petals were fleshy and smelled like old fish, being riddled with squashy maggots! These overfed, easy-living tropical flowers are gross and bestial. The fight for life that plants in the north are accustomed to make, regardless of what the seedsmen tell you, is the very thing that makes them charming and desirable.

Beauty in gardens is like the legendary blue bird of Happiness. One need not chase far afield in a vain hunt for its hiding place. Your own will and favorable weather soon brings it to pass beside your door.

So when I get home from the marts of trade I revel with four friends in my arboreal plot. These chance acquaintances of mine who likewise love this form of outdoor sport are the chipmunk, the toad, the rabbit, and the garter snake. Perhaps their right to be the fauna to my flora is undisputed. Perhaps I am the interloper. The rabbit seems to think so, for he lives up to the Uncle Wiggley stories by nibbling voraciously at my beans that do not wax. The toad and the snake are my allies, for they kill more insects than I do. The darting chipmunk is my constant reminder to step lively in good American fashion, to keep ahead of Jack Frost and the tax collector.

The mystery of growth and fruitfulness, a changing aspect from morning until night, the secret of chemistry of plant and soil, the tranquil moment in the amber twilight, the cleaning of the hoe at nightfall preparatory to a fond farewell as the curtain ends another day; when Mother calls the children in for bed, and I sit down and spoil it all by reading about the political campaign—that's my American home life beside my ambitious garden.

No matter how humble a space we have to till, the planting lust is in us as a rule. Every city tenement has its garden when ash heaps can be shoved aside. Stone apartment houses boast their flower boxes. America has largely sprung from an original race of open country folk. Foxes confined in concrete dens dig furtively at the floor. So, too, the close-hemmed masses of our modern crushing life desire to dig their knuckles into the earth and revive their latent instincts to produce.

It's a great game if you don't weaken! He who gets close to the soil may imbibe some of the alchemy of its age-old power and promise, even if what he can't is far greater than anything he cans therefrom.

Hyphenated legislation and surplus control bills do not haunt the home gardener. The only surplus I have to fret me are bromides and Greek roots. With confidence in my native ability to eat more than I can coax from the land, I am always sure of a task to tinker at. That a l o n e is worth the price of admission and all the fungicide to boot.

Just one last word of caution—keep an eye on the melon patch! Your neighbor's boy is no better than you were, and he's a half brother to the rabbits anyhow.

CAN'T BEAT A LAWYER

A lawyer's dog one day stole a piece of meat from a butcher's counter. The butcher, knowing to whom the dog belonged, went to the owner that evening and put the following question to him:

"Sir, suppose a dog steals a piece of meat from my shop, have I a right to make the owner pay for it?"

"Certainly," replied the lawyer.

"Very well," said the butcher, "I'm sorry to tell you that it was your dog who stole my meat. It weighed three pounds. You therefore owe me a dollar and a half."

Without saying a word the lawyer took out a dollar bill and a fifty cent piece and gave them to the butcher. The next day the butcher received the following statement from the lawyer:

"Due, from A. B., the butcher, to Y. Z., the lawyer, $10.00 for legal advice."

THIS BORES US

"What! Jones in the hospital again?"

"Yeh. His leg."

"I thought he had that amputated long ago."

"He did, and got a wooden one in place of it."

"Well?"

"Corn borers." — *Northwestern Purple Parrot.*

Of all the sad sights in ocean travel the saddest of all is to see a whale blubber.—*Utah Humbug.*

AS YOU LIKE THEM

Recently the proprietor of a country hotel served a fine plate of strawberries to a patron.

Patron: "What beautiful berries! Where did you get them?"

Proprietor: "I raised them."

Patron: "Do you put fertilizer on them?"

Proprietor: "You can put anything you want to on them, but we generally put cream and sugar on."

HARDLY WORTH IT

Little Mary, who had fallen ill, begged for a kitten.

It was found that an operation was necessary for the child's cure and that she must go to the hospital. Her mother promised that if she were very brave she should have the very finest kitten to be found.

As Mary was recovering from the influence of the anesthetic, the nurse heard her muttering:

"It's a rotten way to get a kitten."

The colored preacher was standing church trial for hugging one of the dusky maidens of his congregation. He pleaded that as shepherd of the flock it was his duty to take the lambs into his arms.

This caused considerable embarrassment to the jury who finally brought in a verdict clearing him of the charge but with this suggestion, "Howsumevah we suggests dat next time brudder Jones feels called upon to take de lambs into his arms dat he take de ram lambs."

SAFEGUARD *your* WHEAT

POTASH gives wheat the extra vigor it needs when planted after the fly-free date. Potash produces plump, sound grain, thereby increasing the test weight per bushel. When potash is lacking, the grains ripen too early and lack quality; the stems and leaves die while the grain is still immature; and the wheat suffers from winter-killing.

WITH POTASH

WITHOUT POTASH

The best way to insure a good wheat crop and control winter-killing is to plant after the fly-free date and use liberal applications of a fertilizer containing plenty of potash. The right seed, a good cropping system, and the proper fertilizer will safeguard your crop and stabilize quality and yields.

Try at least 6% to 8% of potash in your wheat fertilizer this fall. It will benefit not only your wheat crop but the succeeding crops in your rotation as well, and is especially helpful in getting a good stand of clover hay following the wheat.

FREE—Write today for your copy of our booklet, "Better Grains and Hays."

Agricultural and Scientific Bureau

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